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BUREAU OF MINES
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GEOPHYSICAL ABSTRACTS 127

OCTOBER - DECEMBER 1946

WITH AN INDEX TO ABSTRACTS 124-127

COMPILED BY

V. L. SKITSKY

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 127

October-December 1946[1]

Compiled by V. L. Skitsky[2]

CONTENTS

		Page
Foreword		1
1.	Gravitational methods	2
2.	Magnetic methods	7
3.	Seismic methods	12
4.	Electrical methods	20
5.	Radioactive methods	24
6.	Geothermal methods	28
7.	Geochemical methods	29
8.	Unclassified geophysical subjects	30
9.	Related nongeophysical subjects	36
10.	Patents	43
	Index to Geophysical Abstracts 127, October-December 1946	51
	Index to Geophysical Abstracts 124-127, January-December 1946	56

FOREWORD

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1. GRAVITATIONAL METHODS

8807. Ballarin, Silvio. Considerazioni intorno ad alcuni metodi per il calcolo delle reduzioni topografiche nei rilievi Eotvossiani. (Analysis of Certain Methods for Calculating the Topographic Reduction of Eotvos Profiles.) Geofis. Pura & Appl., Milan, vol. 5, Nos. 3/4, 1943, pp. 93-106.

The mathematical principles of the graphic method developed by the author for calculating the topographic reduction of Eötvös gravity data are compared with the formulas of Schweydar customarily used for such purpose. The analysis covers the conditions of application, the general expression of the coefficients employed in derivation, and the mathematical relationships determining the computation of these coefficients. - V. S.

8808. Bulanzhe, Iu. D. Certain Questions of Method in Gravity Surveying. (Abs., in Russian). Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 124.

Certain methodological problems arising in gravimetric exploration are discussed. They include the evaluation of the precision of anomalies based

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upon variometer measurements, the use of formulas for calculating the interval between isoanomaly lines, the determination of the optimal distances between base stations employed in detailed variometer and gravimeter surveys, etc. Formulas are given for determining the scale of gravity maps in conformity with the nature and precision of the field data. (Seismological Institute, Moscow.) - V. S.

8809. Donohoo, H. V. W. Blimps and Mineral Reconnaissance Surveys. Mines Mag., Denver, Colo., vol. 35, No. 11, 1945, pp. 615-620, 642.

The blimp is proposed as a type of aircraft suitable for reconnaissance surveys of mineral deposits, and gravity and magnetic measurements are discussed briefly.

(1) The blimp has the advantages of low flying, constant elevation, minimum vibration, slow motion, long endurance, and accurate horizontal and vertical controls. Its construction, operation, and application to surveying are examined. Consideration is devoted to the different types and history of balloons and dirigibles and to their flight characteristics, viewed in the light of requirements of exploration. Particular attention is given to class L.

(2) Gravity and magnetic measurements fundamentally depend on Newton's law of gravitation and Coulomb's law of magnetic attraction, respectively. These relationships may lead to the determination of the depth of deposits by measurements taken from several altitudes, as has already been attempted in mines and from elevated platforms. The blimp lends itself well to such a procedure. - V. S.

8810. Fang, J. F. Gravity Anomalies and the Deflection of the Plumb Line. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, pp. 316-319.

The mathematical formulas of Vening Meinesz and Gulatee for the relationship between gravity anomalies and the deflection of the plumb line are discussed. For actual use, Gulatee divided the globe into zones surrounding the point to be computed and each zone into sectors of an angular opening $\Delta\alpha$. However, his zone radii and $\Delta g \cos\alpha$ products are not exact for the first three zones because of the use of average values.

The author has devised a method of numerical integration by which he computed corrected values. In order to lessen the work, he offers a diagram for the determination of meridional deflection. This consists of circles and radial lines, which divide the region investigated into compartments showing the meridional deflection for every milligal of gravity anomaly. The use of the diagram and subsidiary table is explained and illustrated by application to three stations in India. - V. S.

8811. Frowe, E. W. A Diving Bell For Underwater Gravimeter Operation. Geophysics, Tulsa, Okla., vol. 12, No. 1, 1947, pp. 1-12.

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The recent development of a diving bell, designed to carry a gravimeter and observer, enables the geophysicist to make correct gravity observations on a river, lake, or ocean floor. The bell, for which patents have been applied, is designed to operate in depths of water as great as 250 feet. It has been used with good results at depths ranging from 8 to 70 feet. Data taken from adjacent land and sea areas have been contoured, and the smoothness of the resulting contours indicates that the underwater gravity readings are entirely reliable.

Structural features of the diving bell and related equipment are described and plates showing exterior and interior views of the bell are given. - Author's abs. (An abstract appeared in Oil & Gas Jour., vol. 44, No. 48, 1946, p. 101.)

8812. Guzman, J. A. Memoria del ministro de minas y petroleos, 1945. (Report of the Minister of Mines and Petroleum, 1945.) Bogota, Colombia, Imp. Nat., vol. 2, 1946, pp. 65-97.

Geological, seismic, and gravimetric surveys were made in Columbia in 1944. A table in the Report's section on oil exploration and drilling lists the regions explored, the methods used, and the oil companies financing the work. Drilling activities are described. - V. S.

8813. Huelin, G. S. La determinacion de la figura de la tierra y el teorema de Stokes. (Determination of the Form of the Earth and the Theorem of Stokes.) Rev. Geofis., Madrid, vol. 4, April-June 1945, pp. 227-241.

The author presents general considerations on the determination of the geoid, critical examination of the gravimetric method, isostatic theory, conditions of the application of the theorem of Stokes, and effects of the fields of gravity anomalies. - Bull. Analyt., CNRS, Paris, vol. 7, No. 6, pt. 1, 1946, p. 1052. Transl. by V. S.

8814. Kazinsky, V. A. On the Application of Curvatures. Compt. rend. (Doklady) Acad. Sci. USSR, Moscow, vol. 48, No. 9, 1946, pp. 622-625.

In the determination of the component deflections of the plumb line by the variometer method, equations for the angles of deflection are usually solved by recourse to geometry. The author demonstrates mathematically a simpler analytical method based on the equation of R. Etwesh. This method does not eliminate the difficulties of integration of the gravitational field but overcomes them by analytical calculation made with the use of a variometer net of triangles. As a result, a system of equations is deduced for the relative evaluation of the deflections. Their resolution by means of simple computational schemes is illustrated by an example from actual practice. - V. S.

8815. Oil, New Orleans, La. Seeking Oil Beneath Bahaman Waters. Vol. 6, No. 7, 1946, pp. 12, 34.

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The Standard Oil Co. of New Jersey is conducting gravimetric exploration over some 2,000 square miles of ocean floor in the northwestern Bahamas. The depth of the water in most places does not exceed 20 feet. Observations are made in a 2-ton diving chamber operated from a 112-foot ship equipped with radar for determining the position of stations. Radar targets 25 feet high, distributed at significant points over the exploration area, can be picked up over distances of 18 miles by means of the radar-wave guide atop the mast for a recording on the radar screen of the navigator. In the shallowest localities, the gravity measurements are made from a 22-foot airboat equipped with a rudder and operating in water less than 6 inches deep. - V. S.

8816. Petroleum Times, London. Anglo-American Oil Co.'s Search for Oil in Britain. Vol. 50, No. 1,274, 1946, pp. 526-528.

Oil search by the Anglo-American Co. in Great Britain during 1945 is reviewed. Geophysical exploration has centered in southern England, where further prospecting licenses were taken. As a preliminary attack, a detailed gravity survey was made of Hampshire, with a semidetailed extension over Salisbury Plain. The results suggest some promising structures not revealed by surface geology, and detailed geological mapping of the favorable sections is proposed. Select portions of the licensed territory may be covered later by seismic reflection and refraction surveys. In Great Britain the reflection method has been less effective than the refraction method. - V. S.

8817. Rankine, A. P. Prospecting for Oil. Petrol., London, vol. 9, No. 10, 1946, pp. 234-235.

The nature of geophysical prospecting for oil is explained by a brief consideration of the geological problems involved and the principles of gravitational and seismic measurements. Gravimetric instruments can detect gravity changes as small as one part in ten million, which corresponds to a change of height of only 1 foot. Investigations are being made to perfect gravity measurements under water. Seismic measurements determine the travel time of mechanical vibrations propagated down to potential oil-bearing rocks and back to the surface. - V. S.

8818. Roman, Irwin. An Observational Method to Overcome Zero Drift Error in Field Instruments. Geophysics, Tulsa, Okla., vol. 11, No. 4, 1946, pp. 466-490.

By using a four-stop oscillating method of observation, four values are obtained for the increment in the measured value between consecutive stations. If the drift or "zero creep" of the instrument is regular, even when large, or not linear, this furnishes a means of improving the reliability of the readings and permits the detection of erratic readings. In areal surveys, a primary net of values may be established by this oscillating method and this net used as a base into which to adjust chains of observations. Intermediate values may

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sometimes be desirable, such values being adjusted into the primary net by the oscillating method. An example shows the application of the method to a gravimetric survey. - Author's abs.

8819. Saxov, S. E. Some Gravity Measurements on the Island of Bornholm. Geodaetisk Institut, Copenhagen, Rept. 19, 1945, 30 pp.

The Royal Danish Geodetic Institute made a gravity survey of the island of Bornholm in 1944. The static gravimeter of Nørgaard was used over a network formed by 8 base stations with 10- to 15-km. intervals and secondary stations with 1.5-km. intervals; the main station of Bornholm was connected with the Central Station at Copenhagen. The survey included a gravimetric investigation of geological profiles over rifts and dikes of diabase, with seven of the profiles yielding positive indications. The field procedures are outlined and the data tabulated for the basic and secondary stations, the mean errors ranging from 0.10 to 0.20 mgl. The values were reduced by the methods of Airy-Heiskanen and Vening Meinesz.

The isoanomaly map of 1944 agrees closely with the map obtained by the gravity survey of 1938-41 (Geoph. Abs. 118, No. 7512) but gives more details. Both maps show unusually numerous anomaly curves in the western part of Bornholm, indicating a lack of static equilibrium. - V. S.

8820. Scheffer, Vittorio. Sull'impiego dei gravimetri in terreni montagnosi. (On the Use of the Gravimeter in Mountainous Terrain.) Geofis. Pura & Appl., Milan, vol. 3, No. 4, 1941, pp. 194-199.

Detailed gravimetric exploration, and particularly the transportation of equipment, is discussed in connection with surveys over mountainous terrain. Consideration is given to the use of automotive vehicles of special design and other means. As an example of a solution adapted to local conditions, the transportation of a Boucher gravimeter on the back of mules is described, as employed by the Geophysical Section of the Società Petrolifera Italiana in the Tusco-Emilian Appenines. The construction of the instrument, the accessory equipment, and the method of observations are outlined. - V. S.

8821. Volet, C. Sur la mesure absolue de la gravité. (On the Absolute Measurement of Gravity.) Compt. rend. Acad. Sci., Paris, vol. 222, Feb. 11, 1945, pp. 373-375.

A description is given of a method of gravity measurements utilizing the free fall of a body and employing for the body the index scale itself. The precision of determinations should at least equal that of the best measurements by pendulum. - Bull. Analyt., CNRS, Paris, vol. 7, No. 5, pt. 1, 1946, p. 845. Transl. by V. S.

8822. Zwerger, Rudolf, von. Zur geologischen Deutung regionaler Anomalien der Schwere und des Erdmagnetismus. (On the Geological Significance of

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Regional Anomalies of Gravity and Geomagnetism.) Ztsch. dtsch. geol. Ges., Berlin, vol. 95, March 1943, pp. 67-69.

This paper presents a schematic summary of the conclusions that can be drawn from the recent results concerning the deep geology of Germany. Corrections and amplifications to be made with respect to notions already formed are suggested. - Bull. Analyt., CNRS, Paris, vol. 7, No. 1, pt. 1, 1946, p. 26. Transl. by V. S.

2. MAGNETIC METHODS

8823. Canadian Mining Journal. The New Airborne Magnetometer. Gardenvale, Que., vol. 67, No. 10, 1946, pp. 953-956; abridged in Northern Miner, Toronto, vol. 32, No. 26, 1946, p. 9.

A lecture on the airborne magnetometer was given by J. R. Balsley, Jr., and L. H. Rumbaugh at Ottawa under the auspices of Government agenices of the United States and Canada. The account outlines the invention, the phases of the related research, the operation of the apparatus, the duties of the crew, the flight techniques, the test surveys conducted, and the limitations of airborne magnetometers essentially in accordance with Balsley's U.S.G.S. report (see Geoph Abs. 126, No. 8659). The lecture was accompanied by a demonstration in the air, and experimental flights were made in northern Quebec and Ontario. - V. S.

8824. Department of Scientific & Industrial Research, N. Z. 38th Annual Report, 1943-44, Geological Survey. Wellington, Gov. Print., 1944, pp. 1-2.

N. Modriniak has made magnetic and seismological observations in the Whakatane district to investigate the possibility of obtaining volcanic heat near the sea and to extend the magnetometer work done at Rotorua. E. O. Macpherson prepared reconnaissance geological maps of the Whakatane district and Whale Island. Modriniak also continued the investigation of possible dam sites on the Waikato River upstream from Arapuni Lake. Only magnetometer work was practicable. At Hunty, an attempt is being made to ascertain the shape and structure of the coal basin concealed by the sands and silts of the Waikato north of the present mines. The geophysical drill has been found most useful in boring for serpentine water in North Auckland and for coal at Hunty. - Report on Geophysical Exploration. Abridged by V. S.

Donohoo, H. V. W. Blimps and Mineral Reconnaissance Surveys. Mines Mag., Denver, Colo., vol. 35, No. 11, 1945, pp. 615-620. (See abs. 8809 in this issue.)

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8825. Elsasser, W. M. Induction Effects in Terrestrial Magnetism: Secular Variation. Phys. Rev., Lancaster, Pa., vol. 70, Nos. 3-4, 1946, pp. 202-212.

The method previously developed by the author for the integration of the electromagnetic field equations in the presence of fluid motions in a spherical conductor now serves for an interpretation of secular geomagnetic variations. It enables the author to study the skin effect, which shows that the observed variations of the dipole terms originate in a layer adjacent to the core's boundary several hundred kilometers deep. The zonal fluid, when considered in terms of a coupling matrix, is found to produce rotation of the tesseral magnetic dipole terms as well as oscillatory changes in the amplitude of these terms.

As there is only one type of matrix element that represents an interaction of the main magnetic dipole with itself, and as the corresponding fluid motion is a meridional flow of quadrupole symmetry, amplification or deamplification with this term depends on the sign of the velocity. Accordingly, the theory advanced can account for all the observed components of the secular variation. - V. S.

8826. Fleming, J. A. Geomagnetic Secular Variations and Surveys. Proc. Phys. Soc., London, vol. 58, pt. 3, No. 327, 1946, pp. 213-246.

The secular variations of the earth's field call for frequent determinations of the geomagnetic elements at many selected stations on land and at sea. So far, general world magnetic surveys have of necessity been restricted to the surface of the earth. The previous surveys have led to great improvement in our knowledge of the distribution of the field, especially during the past few decades. During the war, much attention has been devoted to the study and analysis of data well-distributed over the earth's entire surface at more than 10,000 stations. These investigations have resulted, for the first time, in the preparation of accurate isoporic charts, that is, charts of equal annual rate of change for magnetic declination, inclination, and the horizontal, vertical, eastward, northward, and total components of the field for the four epochs of 1912.5, 1922.5, 1932.5, and 1942.5. The motions of the maximum and minimum isoporic foci during these four epochs indicate the complexity of the secular changes and interpretations. - Author's abs. abridged by V. S.

8827. Frenkel, Ia. I. On the Origin of Terrestrial Magnetism. Compt. Rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 49, No. 2, 1945, pp. 98-101.

Terrestrial magnetism is explained by the convective motion of the electrically conductive mass in the center of the earth. The core consists of molten metal possessing a high temperature gradient, which generates convection currents in the liquid metal. Owing to the high electric conductivity of this liquid, its motion in any accidental, initially weak, magnetic field may be accompanied by a gradual increase of that field and of the electrical currents producing it, generated by the mechanism of self-excitation. However, forces

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of electromagnetic friction tend to slow down the motion of the liquid, so that in the stable state the entire power is converted into Joule's heat. The magnitude of the magnetic field and the related factors are deduced mathematically. - V. S.

8828. Giulietti, Giulio, and Bossolasco, Mario. Applicabilita' di nuove bussole alla determinazione degli elementi angolari del campo geomagnetico. (Application of the New Compass to the Determination of the Angular Elements of the Geomagnetic Field.) Geofis. Pura & Appl., Milan, vol. 3, No. 4, 1941, pp. 200-203.

The new induction compass of Giulietti can be used in geomagnetic investigations and navigation. In application to surveys, it serves for measuring both geomagnetic declination and inclination. The construction of the instrument, the principles of its use, and the procedures of observation are indicated briefly. The precision is considered high and the field technique simple and convenient. - V. S.

8829. Harang, Leiv. The Mean Field of Disturbance of Polar Geomagnetic Storms. Terr. Magn. & Atm. Electr., Baltimore, Md., vol. 51, No. 3, 1946, pp. 353-380.

The diurnal variation of the mean disturbance vectors is determined at a number of observatories lying roughly along the geomagnetic meridian 120° from Spitzbergen to Potsdam. The values of the vectors have been obtained for four degrees of geomagnetic activities. The variation of the mean disturbance field across the geomagnetic meridian 120° in the course of the day is drawn up on maps for each of the three components in D, H, and Z.

It is shown that the graphical representation of the variations in the mean D-field can be regarded as a fairly good approximation to the mean disturbance-field around the polar cap. The oscillations in the position of the D-field and of the auroral zone are studied for various degrees of geomagnetic activities and compared with the mean positions of the aurora. Other questions of the D-field and aurora are discussed. - Author's abs. abridged by V. S.

8830. Hartmann, P. C. P. Aardmagnetische anomalieen in Nederland. (Geomagnetic Anomalies in the Netherlands.) N. V. Uitgeversmaatschappij, J. H. Kok, Kampen, Netherlands, 1945, 62 pp.

The above is a dissertation of the University at Utrecht. Chapter 1, The magnetic measurements; Chapter 2, Magnetic anomalies and geotectonic geology; Chapter 3, The local anomalies. Summary in English. - J. F. S., Dominion Observatory, Ottawa, Bibliography of Seismology, No. 19, 1946, p. 321.

8831. Hurwitz, Louis, and Howe, H. H. Magnetic Observatory Results at San Juan, Puerto Rico, for 1929-30. U. S. Coast and Geodetic Survey, Washington, D. C., MO-24, 1945, 124 pp.

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This publication contains extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, lists of principal magnetic disturbances, amounts of noncyclic change, observed and adopted base-line values of the D, H, and Z variometers with their abrupt changes, etc. The text comprises a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Authors' abstract.

8832. Jensen, Homer. Validity of Data from Airborne Magnetometer. World Petroleum, New York, vol. 17, No. 9, 1946, p. 45.

The airborne magnetometer developed by the U. S. Navy and Bell Telephone Co. has been tested by the U. S. Geological Survey in application to magnetic surveying. The results point to marked advantages over ground surveys and a higher precision of data. (1) Continuous recording eliminates the need for the interpolation of data, simplifies the corrections for drift and diurnal variation, and assures the registering of actual peaks and troughs on every traverse. (2) The high altitude of flying nullifies the effects of nongeological influences from the ground, which either fail to register or can be identified easily. (3) The frequency characteristics of the instrument causing a lagging and a nonlinear response require corrections only with the small, high-gradient anomalies associated with metal deposits, but not with the large, low-gradient anomalies associated with oil structures. Other advantages are noted. The conclusion is reached that in all magnetic surveys except the most detailed ones the airborne instrument provides data more precise and more closely related to local geology than ground magnetometers. - V. S.

8833. Keller, Fred, Jr., and Hanners, A. J. A Continuously Recording Declination Station. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 485-489.

The general lack of data on the diurnal variation and secular change of the earth's magnetic field at other than the locations of the few magnetic observatories in the world makes it necessary to have inexpensive recording stations thay may be operated unattended for long periods of time.

As partial fulfillment of this need, the Coast and Geodetic Survey has proposed building a network of 20 stations in the United States. These stations are to operate for periods of 3 to 6 months without servicing, and are eventually expected to continuously record the three magnetic elements - declination, horizontal intensity, and vertical intensity. - Authors' abs.

8834. Petroleum World. Scouting the Oil Fields. Los Angeles, Calif., vol. 43, No. 7, 1946, pp. 31-37.

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This article on California oil developments includes brief remarks on the Gulf airborne magnetometer, its operation, results of tests, advantages in exploration, and promise of new discoveries. Mention also is made of the diving bell for gravity measurements designed by R. Bauers and J. Jakosky. - V. S.

Roman, Irwin. An Observational Method to Overcome Zero Drift Error in Field Instruments. Geophysics, Tulsa, Okla., vol. 11, No. 4, 1946, pp. 466-490. (See abs. 8818 in this issue.)

8835. Scott, W. E. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for January to March 1946, and April to June 1946. Terr. Magn. & Atm. Electr., Baltimore, Md., vol. 51, 1946, No. 2, pp. 243-246, No. 3, pp. 435-438.

Tables are given with explanatory text. - V. S.

8836. Skillings' Mining Review. Magnetic Base Stations for the Iron Ranges. Duluth, Minn., vol. 35, No. 10, 1946, p. 2.

Magnetic surveys in the iron ranges of Minnesota and Michigan will be rendered more precise by the magnetic base stations now being established by the United States Bureau of Mines. These stations should aid calibration of instruments, accuracy of measurements, and correlation with previous data. The work is made by means of a special magnetometer designed by the Bureau's Division of Geophysical Exploration. This is equipped with a Helmholtz coil for gaging sensitivity of determinations and has a precision within 5 gammas. The locations of the stations already established in the Cuyuna, Gogebic, Menominee, and Marquette iron ranges are indicated. Upon completion of the work, the Bureau will publish the magnetic data at all the base stations for the use of prospectors. The stations will be tied into the national magnetic base at Cheltenham, Md. - V. S.

8837. World Petroleum. Flying Eye for Oil Exploration. New York, vol. 17, No. 9, 1946, p. 44.

The military origins, exploratory applications, component instruments, procedures, advantages, and possibilities of the Magnetic Airborne Detector (MAD) are outlined briefly. Two principal models have been developed for oil prospecting, one by the Gulf Oil Co., and the other by the U. S. Naval Ordnance and associated laboratories. The Gulf model will be used over the Bahamas continental shelf; the Navy model may serve to survey Naval Reserve No. 4 in northern Alaska. - V. S.

Zwerger, Rudolf, von. Zur geologischen Deutung regionaler Anomalien der Schwere und des Erdmagnetismus. (On the Geological Significance of Regional Anomalies of Gravity and Geomagnetism.) Ztsch. dtsch. geol. Ges., Berlin, vol. 95, March 1943, pp. 67-69. (See abs. 8822 in this issue.)

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3. SEISMIC METHODS

8838. Berson, I. S. Interpretation of Tansverse Hodographs of Refracted Waves: One Level Surface of Separation. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, pp. 115-116.

Transverse hodographs have acquired considerable importance in seismic prospecting by the correlation method of refracted waves (Geoph. Abs. 121, No. 7970). Until lately, such hodographs were interpreted on the assumption that the lengths of the transverse profiles employed are very small in comparison with the distances of these profiles from the shot point. To expand usage, the author offers a method of interpretation applicable to transverse profiles of any limited length. The principle applied consists in subtracting an averaged hodograph from the observed hodograph. A technique is worked out for a practical determination of the maximum length of the transverse profile compatible with a single interpretative solution at any angle of longitudinal sloping. (To be published in Trans. Inst. Theor. Geophys., Moscow.) - Transl. by V. S.

8839. Branson, N. G. Strain-Gauge Amplifier. Gen. Elect. Rev., New York, vol. 48, No. 4, 1945, pp. 55-58.

The paper discusses how a multichannel amplifier enables a magnetic oscillograph to be used with an electric gauge to record dynamic and transient quantities. - Dominion Observatory, Ottawa, Bibliography of Seismology, No. 18, 1945, p. 296.

8840. Caloi, P. Determinazione delle coordinate ipocentrali di un terremoto ad origine vicina con i templi delle onde longitudinali e trasversali dirette. (Determination of the Coordinates of the Hypocenter of a Nearby Earthquake by Means of Arrival Times of Direct Longitudinal and Transverse Waves.) Ricerca Sci., Rome, vol. 12, Apr. 1941, pp. 431-437.

This paper discusses analytic determination of the coordinates and the depth of the hypocenter of a nearby earthquake upon the basis of known velocities of propagation and measurement of arrival times of direct longitudinal and transverse waves. - Bull. Analyt., CNRS, Paris, vol. 7, No. 4, pt. 1, 1946, p. 631. Transl. by V. S.

8841. Cody, C., and Cody, M. Seismograph Exploration in Venezuela. Petroleo Interamericano, Tulsa, Okla., vol. 4, No. 11, 1946, pp. 56-64.

In Venezuela, geophysical exploration has been on the increase during the past 5 years. Activities now center in several geological provinces: (1) Lake Maracaibo area has 4 geological parties, 4 gravity parties, and 4 seismic parties; (2) Barinas area has 1 geological party, 1 gravity party, and 4 seismic parties; and (3) Eastern Venezuela, including Guarico, has 9 geological parties, 3 gravity parties, and 19 seismic parties, with the bulk of the seismic work conducted in the plains south of the Andes.

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Seismic exploration is handicapped by the scarcity of roads, accomodations, and means of communication. A seismic party numbers from 50 to 250 men, depending on local geology and the seismic method employed. Typically, the personnel consists of the party chief, geophysicists, computer, observer, surveyor, tool-pusher, medical doctor, field cashier, general utility man, cooks, mess attendents, watchmen, recording crew, shooting crew, surveying crew, and drilling crew. - V. S.

8842. Coulomb, Jean. Sur la vitesse de propagation de la rupture dans une faille. (On the Velocity of Propagation of a Rupture in a Fault.) Ann. Géophys., Paris, vol. 2, No. 1, 1946, p. 86.

H. Benioff has calculated the velocity of propagation of the rupture of a fault upon the basis of seismic records of the Long Beach earthquake of March 10, 1933, and arrived at the value of 4.2 km./sec. The author reviews Benioff's determination and amplifies the latter's conclusions by pointing out that only if the fault's extension was larger than 27 km., which seems very probable, is the velocity deduced correctly. If the fault's extension was less than that, the velocity would be greater than 4.2 km./sec. - V. S.

Department of Scientific & Industrial Research, N. Z. 38th Annual Report 1943-44: Geological Survey. Wellington, Gov. Print., 1944, pp. 1-2. (See abs. 8824 in this issue.)

8843. Gamburtsev, G. A., et al. Field Work on Perfecting Seismic Methods for Exploration in the Eastern Apsheron Peninsula. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, pp. 119-120.

A survey has been made in the Baku oil region on the Apsheron peninsula, USSR, with a view to perfecting the local application of seismic prospecting. The method chosen was correlation refraction, a new modification of customary seismic refraction. Contrary to established views, the results showed that the Tertiary arenaceous clays of the peninsula can be differentiated satisfactorily. Refracting layers characterized by unexpectedly high seismic velocities were discovered at considerable depths, in particular at the roof and base of the oil-bearing formations; some of them were traced over wide distances. The applicability of refraction was considered conclusively domonstrated.

It also was found that the method of seismic reflection gives results complementary to those of refraction, and that the two methods should be used together. In all, the data clarified general seismic methodology and interpretation in Apsheron, peculiarites of seismic propagation in heterogeneous media, and special questions of Apsheron seismics. (Inst. Theor. Geophys., Moscow.) - V. S.

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8844. Gamburtsev, G. A. Concerning the Question of the Origin of Seismic Reverberation at Sea. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 120.

The author analyzes several alternative explanations of the effects of seismic reverberation at sea which interfere with seismic exploration by the method of reflections. He finds that the most plausible hypothesis is that the interference originates in diffusion. Only a tentative solution can be reached at present because of insufficient experimental data. Additional experiments are planned. (Inst. Theor. Geophys., Moscow.) - V. S.

8845. Gogoladze, V. On Rayleigh Boundary Waves. Compt. rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 49, No. 6, 1945, pp. 400-403.

A mathematical analysis is given of the spectrum of free vibrations in two different solid elastic media in contact along a plane, with a veiw to establishing the necessary and sufficient conditions for the existence of Rayleigh boundary waves. Use is made of the equations of the potentials of elastic waves, the Rayleigh equation, and Riemann's surfaces; the mathematical deductions are presented. It is found that the investigated conditions for the existence of a point spectrum of free vibrations are as follows: $R(b_2) > 0$ for $b_2 < b_1$, or $R(b_1) > 0$ for $b_1 < b_2$. The Rayleigh boundary wave is ultimately expressed in four analytic equations, two for $y > 0$ and two for $y < 0$. - V. S.

8846. Gogoladze, V. General Formulae for the Reflection and Refraction of Non-Stationary Elastic Waves. Compt. Rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 49, No. 7, 1945, pp. 479-481.

The results of the author's mathematical investigations on the propagation of elastic waves are expressed in four general formulas for the reflection and refraction of such waves. These show that elastic disturbances may be considered as an aggregate of longitudinal and transverse waves reflected and refracted under real and complex angles in the plane of separation between elastic media. Under certain conditions, the Rayleigh boundary wave is added to them with a propagation velocity smaller than that of all other waves.

The application of the formulas is discussed for a set of conditions determining the velocities of longitudinal and transverse waves. In the case of propagation of heterogeneous waves, the horizontal component of the energy flow is found to have a constant direction, whereas the vertical component may change its sign at different points in the course of time. - V. S.

8847. Gutenberg, Beno, and Richter, C. F. Earthquake Study in Southern California, 1945. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 559-560.

This report on the progress of studies of earthquakes in southern California lists the work of the authors on the revised edition of the "Seismicity of the Earth" and on new publications and cites some unpublished observations.

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Reference also is made to the work of H. O. Wood, J. M. Nordquist, and H. T. Orville. The largest earthquake shocks during 1904-45 are tabulated, and estimates are given of seismic energy released during earthquakes of different depth. - V. S.

Guzman, J. A. Memoria del ministro de minas y petroleos, 1945. (Report of the Minister of Mines and Petroleum, 1945.) Bogota, Colombia, Imp. Nat., vol. 2, 1946, pp. 65-97. (See abs. 8812 in this issue.)

8848. Harris, Sidon. West Texas Modern Refraction Seismic Exploration. Oil Weekly, Houston, Tex., vol. 123, No. 7, 1946, pp. 53-55.

In western Texas, the Edwards Plateau, the Delaware Basin, and minor areas on Permian beds have proved unfavorable for seismic reflection, whereas the modern multiple refraction techniques are successful. Unlike the old refraction method, these techniques do not depend on first arrivals and have a greater depth of penetration with less dynamite. A schematic diagram of refraction paths and a sample of a typical record are given; the calculations have been described by C. H. Dix, D. C. Barton, L. B. Slichter, M. Muskat, J. A. Gillin, and the author.

According to performance on the Edwards Plateau, modern refraction can accurately detect possible structure with as little as 200 feet of closure at pre-Permian levels and with as little as 100 feet of closure at Permian levels. It has been credited with the discovery of the Barnhart Pool and, in part, the Midland Farms Pool. Some recommendations are given on planning refraction work on the Edwards Plateau. - V. S.

8849. Kirnos, D. P. On the Possibility that an Alluvial Soil Generates Natural Vibrations. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 98.

The experimental data presented indicate a possibility that explosions and local earthquakes can generate in an alluvial soil its own intrinsic vibrations. (Trans. Seismol. Inst., Moscow, No. 117.) - Transl. by V. S.

8850. Koning, L. P. G. Het mechanisme in den haard van diepe aardbevingen. (The Mechanisms in the Focus of Deep Earthquakes.) Handelingen van het 27-e Nederlandsch Natuur- en Geneeskundig Congres, Haarlem, vol. 27, 1941, pp. 252-254.

The author has collected all the data on the deep earthquake of June 29, 1934, in the Dutch East Indies (depth of focus 700 km.). As the number of data was insufficient to permit the application of the method of Shida and Hiller, the author has supposed the theoretical case that a movement took place along a plane in the interior of the earth at a depth of 700 km. below the surface, and that the hypothetical plane of Berlage coincides with the plane of movement in the focus of the earthquake. The plane of Berlage, in which the hypocentra may be arranged, dips with an angle of 55° beneath Asia. - F. F. S., Dominion Observatory, Ottawa, Bibliography of Seismology, No. 19, 1946, p. 323.

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8851. Leet, L. D. Vibrations from Blasting. Explos. Eng., Wilmington, Del., vol. 24, 1946, No. 2, pp. 41-44, 55-59, No. 3, pp. 85-89.

The author discusses the nature, measurement, and effect of the vibrations transmitted through the ground from high-energy sources, including atomic bombs, and describes the scientific equipment and methods employed for recording and evaluating various types of waves. The data presented refer particularly to the use of industrial explosives, damage to buildings, and the first test of the atomic bomb. Consideration is devoted to waves on water, compressional waves, shear waves, Rayleigh waves, Love waves, coupled waves, and hydrodynamic waves, as well as to the construction and use of the Leet three-component seismograph, with illustration of the apparatus and seismograms.

The results of the past and current observations are analyzed with respect to terrain coefficient, acceleration and displacement, elastic fatigue, effects on structures, and characteristics of true vibration damage. It is found that customary industrial applications of explosives cause no damage to structures. When, however, damage is produced by sufficiently strong vibrations, the cracks appear in the unique form of crisscross or X patterns. (See also Geoph. Abs. 118, No. 7544, and G. A. 124, No. 8377). - V. S.

8852. Macelwane, J. B. The Interior of the Earth. Am. Scientist, New Haven, Conn., vol. 34, No. 2, 1946, pp. 177-197.

Our picture of the interior of the earth is admittedly a provisional one, blurred in many of its line and sketchy in its details. Yet the methods which furnished it have yielded evidence that is now generally accepted. It can be regarded, namely, that there is a layered crust underlain by a shell some 600 miles thick in which the speed of elastic waves increases rapidly with depth; that under this lies an intermediate shell some 1,100 miles in thickness, in which the rate of increase of speed with depth is less rapid but in which the absolute values of the speeds are very high; and that there is at the center of the earth a core or nucleus, with a diameter little more than half that of the earth or about twice as large as that of our moon, which strongly reflects and refracts elastic waves but about whose constitution very little is really known. - Author's abs.

8853. Masarskii, S. I. On Hodographs of Seismic Waves Reflected from the Lower Boundary of a Medium with a Variable Velocity of Propagation. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, pp. 121-122.

An analysis is made of the form of hodographs of seismic waves reflected from the lower boundary of a medium in which velocity is a function of depth. The equation deduced for the curve of such hodographs in terms of parameters shows that the concave side of the curvature faces in the finite direction of positive time. The trajectories of seismic rays are investigated. (To be published in the Trans. Seismol. Inst., Moscow.) - Transl. by V. S.

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8854. Merino y Coronado, J. Notes on a New Type of Electronic Earthquake Recorder. Servicio Meteorologico Nacional, San Jose, Costa Rica, mimeographed text, 1945, 4 pp.

The instrument consists of a Bosch-Omori seismograph provided with an eclipsing vane, which, when the boom is moved, varies the amount of light reaching a light sensitive cell. The current in the circuit controlled by the cell is amplified and used to operate a galvanometer or milliammeter, which serves to move a recording stylus over a smoked sheet mounted on a rotating drum in the usual fashion. - Dominion Observatory, Ottawa, Bibliography of Seismology, No. 19, 1946, p. 324.

8855. Oks, Meyer. Metodo de refraccion. (Method of Refraction.) Bol. Inform. Petrol. (YPF), Buenos Aires, vol. 22, No. 254, 1945, pp. 249-254.

In Argentina the method of seismic refraction has greater application than in the United States because it helps to clarify information about the local regional stratigraphy. Refraction surveys have been made down to depths of 3,500 and 5,500 meters in the valleys of the Rio Colorado and Rio Salado, Buenos Aires Province. As many as six refracting horizons were distinguished, whereas seismological literature offers solutions for only four horizons. To meet local problems, the author presents a method of calculation permitting any number of inclined layers to be reduced to one residual layer. The solution is effected by means of successive approximations worked out by analytical and graphic procedures. Equations and drawings are presented for the steps of 1, 2, 3, and 4 inclined horizons separating successive layers. The velocity of refracted waves is determined by means of a single residual equation. - V. S.

8856. Osterhoudt, W. J. The Seismograph Discovery of an Ancient Mississippi River Channel. (Abs.) Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, p. 417.

In January 1937, a seismic party of the Gulf Research & Development Co. began reflection and refraction seismograph surveys of south Timbalier Bay, Lafourche Parish, Louisiana, and adjacent waters of the Gulf of Mexico in the vicinity of 29° 05' N. latitude, 90° 15' W. longitude. Experimental shooting to determine the thickness of the slow-velocity zone revealed exceptional local variations in depth to a fairly consistent V_2 underlier. By using a measured velocity of 3,800 feet per second for the recent fill-in material and carefully plotting cross-section profiles, enough data were acquired to outline the east flank of an unknown buried river channel, probably over 600 feet deep and perhaps more than 5 miles wide.

This channel possesses the approximate dimensions and characteristics exhibited by the portion of a submarine valley mapped by the United States Coast and Geodetic Survey in the Gulf of Mexico from 28° 14' N., 89° 27' W. through 28° 38' N., 89° 57' W. Further exploration by seismograph methods, core holes, and electronic logging of shallow holes is discussed. - Abridged by V. S.

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8857. Pendse, C. G. On the Theory of Seismometers. The London, Edinburgh & Dublin Philos. Mag. and Jour. Sci., London, vol. 35, No. 249, 1944, pp. 706-713.

In the theory of seismometers developed in seismological writings, full consideration does not appear to have been given to the fact that the motion recorded by a seismometer is relative to a frame determined by the instrument, whereas the system of forces in question refers to axes "fixed in the earth" relative to which the frame determined by the instrument also moves. In this paper it is proposed to obtain the exact equation of motion of a seismometer and to investigate it in an important particular case. The present work will apply mainly to horizontal seismometers.

In section 1, the exact equation is obtained in its most general form and is simplified without any loss of generality; an important particular case is taken and the corresponding equation is derived. In sections 2 and 3 this equation is solved as far as the first order of the acceleration terms. In section 4, the results obtained are discussed in relation to seismometers and seismograms. Finally, in section 5 another form for the ground motion is considered briefly. The new features shown by the investigation include the existence of resonance periods other than the free period of the instrument. - Author's abs.

8858. Perri, Emilio. Determinazione di profondita ipocentrale effettuata col sussidio di un nuovo metodo energetico. (Determination of Hypocentral Depth by Means of a New Energy Method.) Geofis. Pura & Appl., Milan, vol. 5, Nos. 1-2, 1943, pp. 47-76.

The author presents his new "energy method" for calculating the hypocentral depth of earthquakes. The underlying theory is deduced mathematically, and its practical application is illustrated for the earthquake of December 30, 1935, in Schwarzwald, Germany. The method does not depend on any time data and allows determinations of coefficients of energy absorbtion and of divergence parameters for the anisotropy of the medium. The results obtained in the example of the earthquake agree with previous determinations of hypocentral depth made by macro- and microseismic methods. - V. S.

Rankine, A. O. Prospecting for Oil. Petrol., London, vol. 9, No. 10, 1946, pp. 234-235. (See abs. 8817 in this issue.)

8859. Reed, Paul. Exploration of Orinoco Delta Fraught with Difficulties of Terrain and Climate. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 10, 1946, pp. 64-66.

The swamps of the sinking Orinoco delta in Venezuela are underlain by thick sediments in a deep geosyncline. Traces of petroleum appear in seeps, asphalt lakes, and the oil wells at Pedernales. The principal producing area of Trinidad is only 9 miles from the delta.

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The Richmond Exploration Co. has been conducting seismic reflection surveys in the northwestern part of the delta with the use of tugs, launches, barges, wind boats, and marsh buggies. The shooting is done at a depth of 75 to 200 feet over a network of straight lines. Because of difficult terrain, only 4 to 6 spreads can be accomplished in a day, each requiring 2 to 3 shots. Aerial photographs from a former survey facilitate the work. The results appear to be promising. - V. S.

8860. Riznichenko, Iu. V. Method for Transforming Space in the Seismics of Continuous Media. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 123.

A method is offered for interpreting the seismic data gathered from heterogeneous and anisotropic media. It comprises reducing such problems to simpler cases in a homogeneous isotropic medium, accomplished by means of certain transformations of space the common feature of which is maintaining the tensor of curvature equal to zero. The transformations can be either isotropic or anistropic. As an example, the method is applied to the calculation of velocities in the Baku oil region. (Inst. Theor. Geophys., Moscow.) - V. S.

8861. Rothé, Edmond. Les tremblements de terre: Leurs causes, leur effets. (Earthquakes: Their Causes and Effects.) Bibl. Philos. Sci., Paris, Flammarion & Co., 1942, 242 pp.

This monograph discusses in popular language the nature of earthquakes and the present state of seismology. The contents cover such subjects as basic and accidental causes of earthquakes, constitution of the globe, isostasy and orogeny, vulcanism and seismology, macroseismic observations, seismic sounds, relation of seismology to deep geological structure and to the other geophysical sciences, etc. An extensive bibliography is given. - V. S.

8862. Savarenskii, E. F. Concerning the Determination of an Epicenter. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 95.

An analysis is made of the determination of the time of occurrence of an earthquake and of the geographical coordinates of its epicenter. The only data employed are the absolute arrival times of the first phase P at three stations. (Published in Trans. Seismol. Inst., Moscow, No. 117.) - Transl. by V. S.

8863. Vening Meinesz, F. A. De theorie van Wegener. (The Theory of Wegener.) Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap, Leiden, vol. 41, No. 4, 1939, pp. 453-457.

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The article contains a compilation of the geophysical and geological aspects of the theory of Wegener. The seismological investigation of the velocity of propagation of earthquake waves has proved that only beneath the great ocean is this velocity greater than on the continents. Gravity investigations have given indirect support to the theory. Geophysical knowledge at this time is not sufficient to justify the reputation of the conception of Wegener. - J. F. S., Dominion Observatory, Ottawa, Bibliography of Seismology, No. 19, 1946, p. 324.

8864. Weinstein, D. H. Optics of Recording Oscillographs. Geophysics, Tulsa, Okla., vol. 11, No. 4, 1946, pp. 462-465.

The results of A. C. Hardy are applied to show how one can favorably influence the size and shape of a galvanometer mirror to either increase the illumination or decrease the moment of inertia of the mirror without loss of illumination. This applies only to cylindrical systems. It is based on the fact that for maximum illumination, the cylindrical lens in front of the recording paper is focused on the galvanometer mirror which, accordingly, does not act as a stop in the vertical direction. Therefore, the illumination of the galvanometer spot is independent of the mirror height, but depends only on the mirror width.

However, the height of the galvanometer spot on the paper is reduced with reduction in mirror height, so that it becomes necessary to compensate for this by increasing the focal length of the cylindrical lens. The limitations of this procedure and the bearing of the above considerations on timing line intensities are discussed. Attention also is devoted to the illumination of the galvanometer spot on the recording paper of an oscillographic camera. It is shown how one can increase the illumination for a given moment of inertia of the galvanometer mirror, or how the illumination can be maintained with a decrease in the moment of inertia. - Author's abs., abridged by V. S.

4. ELECTRICAL METHODS

8865. Aerial, Geological, and Geophysical Survey of Northern Australia. Geophysical Survey of Lolworth Goldfield, Queeensland. Report for period ended 31 December, 1940, Canberra, 1942, pp. 70-73.

The Lolworth field is situated 70 miles to the west of Charters Towers. An electrical potential-ratio survey was made of that portion that lies around the Mons-Meg and Midas mines. A preliminary investigation in 1936 had resulted in the recommendation for testing two places, and in one of these an auriferrous formation was exposed by trenching. The recent and more detailed survey gave an east-west trending pattern of conductive and resistive indications. Some of the conductive indications are due to narrow veins of sulphides and others to weathered basic dykes in an east-west system of master joints, veins, and fissures. Some of the resistive indications arise from

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unweathered dykes and possibly from quartz reefs. The greisen bodies give two conductive indications in some cases. No cross-joints or fissures were revealed. Testing of some of the conductive indications is regarded warranted. - Abs., Report, p. 7.

8866. Bains, T. M., Jr. Will Radar Aid Our Ghost Camps? Min. Jour., Phoenix, Ariz., vol. 29, No. 6, 1945, pp. 7-9.

A thorough geophysical survey of the Spread Eagle claim in the Whitlock district of Mariposa County, Calif., is being conducted by the Fisher Research Laboratory, manufacturer of M-Scopes. These instruments are a modification of the radar sets used by the United States Signal Corps. - Author's abs.

8867. Baker, J. S., and Miner, K. H. Some Aspects of the Mathematical Interpretation of Electric Logs. Tomorrow's Tools - Today, Los Angeles, vol. 12, No. 2, 1946, pp. 29-30.

The development of "passed-up" sands and their production problems have enlarged the scope of the electric log. The factors and conditions that govern the application of an electric log to such problems are discussed here. The mathematical interpretation of electric logs may be considered a new technique, and among its more important applications is the solution of reservoir evaluation problems. - Authors' abs.

8868. Bays, C. A. Use of Electrical Geophysical Methods in Groundwater Supply. Illinois Geological Survey, Urbana, Circular 122, 1946, 35 pp.

The methods and applications of electrical resistivity surveys and well-logging surveys to ground water problems in Illinois are outlined. Consideration is given to field procedures, results, and modes of interpretation. It is found that the resistivity surveys have greatly reduced the amount of required test drilling and have uncovered many new sources of supply that would not have been detected otherwise. Logging surveys have yielded new geological data on wells, broadening the basis for future exploration. - V. S.

8869. Chemical Engineering and Mining Review. Limitations of Geophysical Prospecting. Melbourne, Australia, vol. 38, No. 450, 1946, p. 187.

From 1928 onward, several geophysical organizations have conducted exploration for mineral ore in Australia and found promising indications. But the tests of these indications by drilling usually were delayed, so that the geophysical claims went unchecked. Now a report is published by E. Broadhurst on the Wallaroo-Moonta copper mines, which summarizes both the electrical surveys and the boring results (Geoph. Abs. 126, No. 8709). Significantly, this area has been favorably reported by all the electrical and geological surveys made at various times. However, boring operations at the selected sites detected

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no ore. Such results point to the limitations of geophysical prospecting in ore finding. Doubtless, the methods are of great value in the case of large sulfide ore bodies lying close to the surface. But, generally, the many factors involved, such as the presence of salt water, changes in rock characteristics, and alterations in structure, necessitate much caution in the interpretation of results. - V. S.

8870. Fisher Research Laboratory. The M-Scope, a Tool for the Mining Industry. Palo Alto, Calif., 14 pp.

The Metallascope (M-Scope) introduces into the earth a symmetrical field of electromagnetic radiation by means of a transmitter loop consisting of numerous turns of wire placed vertically. A sensitive directional loop is used for reception and is adjusted for normal electromagnetic balance. When a metal or metallic sulfide or other mineral more electrically conductive than the surrounding rocks enters the primary electromagnetic field, a secondary field is induced, which distorts the primary field and disturbs the originally balanced circuit. The amount of disturbance depends on the mass, depth, and degree of mineralization of the ore body, and it registers on a meter and in the earphones of the receiver unit. A light portable model and a heavier coupled model of the Metallascope are described and the field techniques are explained. - V. S.

8871. Furnival, G. M., and Tovell, W. M. Structure Drilling in Oil Exploration, Southern Alberta. Canadian Min. & Metal. Bull., Montreal, No. 403, 1945, pp. 726-744.

About 270 boreholes were drilled in the plains of southern Alberta during 1943-45 to determine the structure of underlying sediments. Exploration covered an area of nearly 1,800 square miles and revealed Cretaceous sandstones and shales whose geology is discussed. The drilling was accompanied by electrologging made by means of the potential-impedance single point method. Potentiometers and ammeters indicated the change in self-potential and resistivity as the electrolog passed through a hole. Samples of curves are given.

The correlation of strata by the electrolog proved difficult in the case of lenticular sandstone beds, but satisfactory for marine shales with beds of concretionary siltstone and bentonite. Siltstone gave a high resistivity peak on the curve, and bentonite a depression. Other observations are indicated. Where correlations were based on sufficient data, the total error in the determination of the elevation of a formation apparently did not exceed 10 feet. - V. S.

8872. Gorman, L. J. Electrolysis Surveys on Underground Cables. Corrosion, Houston, Tex., vol. 1, No. 4, 1945, pp. 163-177.

A summary is presented of the survey methods and test analyses employed by the Consolidated Edison Co. of New York to evaluate the severity of

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corrosion of its electrical cables. The principal causes of corrosion are classified as direct chemical attack, stray-current electrolysis, galvanic attack, and electrolytic process due to environmental conditions.

Environmental types of electrolytic cells produce about 65 percent of corrosion on cables. Among the electrolytic surveys and tests devised for detection, the most advanced is the duct survey used to investigate the electrolytic conditions existing in duct sections between manholes. A test electrode is pulled through a vacant duct installed near the ducts that carry cable. Instruments are connected between this electrode and the lead sheath of the adjacent cable, and measurements of electrical potential, current, and resistance are made at frequent intervals throughout the duct. The characteristics of the record indicate whether existing processes are due to an external source of potential or to an electrolytic cell condition set up by variations in the environment. Particulars of the procedures and instructions for optimal results are given. The analysis of the data on electrolytic conditions is illustrated by results of surveys made over a period of 4 years. - V. S.

8873. Lee, F. W., Scharon, H. L., and Sandberg, C. H. Prospecting for Mineralization in Steeply Dipping Beds Covered by Glacial Till, Talus, and Weathered Zones. U. S. Bureau of Mines, Washington, D. C., Tech. Paper 694, 1946, 19 pp.

An electrical prospecting technique has been described, which also has been tested in the field for prospecting for mineral deposits covered by glacial till, sediments, and volcanics. Details of the method of applying this technique have been explained and discussed. This method differentiates the electrically isotropic conducting material from the anisotropic conducting material. It further permits the measurement of the strike of the buried beds and separates the beds into different classes according to their electrical conductivity. Results of field tests in the Kirkland Lake area of Canada and in the Newtown Flats area of California are a part of this report. - Authors' abs.

8874. Mining Record, Denver, Colo. M-Scope Directed Workers to Ore. Vol. 56, No. 46, 1945, p. 3.

An electromagnetic survey recently conducted at an abandoned mine near Silver City, N. Mex., has detected zinc-lead ore. The instrument used was a new model of G. Fisher's Metallascope employing a radio-frequency field. When the electromagnetic balance of this field is disturbed by a body of different electrical conductivity, the apparatus registers a deviation and gives visual and auditory signals. Measurements at the mine resulted in the discovery of a 14-foot vein and other strikes. (See also Geophys. Abs. 126, No. 8715.) - V. S.

8875. Romanoff, Melvin. Progress Report on the Behavior of Zinc-Iron Couples in Soil. Corrosion, Houston, Tex., vol. 1, No. 2, 1945, pp. 95-102.

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In order to study the effectiveness of zinc for the cathodic protection of iron and steel under various soil conditions, zinc-iron couples were buried at eight test sites in 1941. The electrical-measurement data presented refer to (1) the current flowing in the galvanic circuit; (2) the potential of each electrode to a copper-copper sulfate electrode after opening all circuits for 1 hour; (3) the voltage of the couple; and (4) the current required for cathodic protection of the iron rings. The couples from two sites have been removed and examined. One of these showed moderate protection and the other almost complete protection. A possible explanation for the different results at the two stations is offered. - Corrosion, vol. 1, No. 3, 1945, Abstracts, p. 21.

8876. Westman, B. J. Geophysical Surveying Followed by Diamond Drilling. California Min. Jour., Auburn, vol. 16, No. 2, 1946, p. 14.

Brief remarks outline the principles and advantages of the resistivity and natural-potential methods of electrical prospecting for minerals. Examples of prospecting combined with geological investigation and diamond drilling, as practiced in Canada, are cited in support of recommendations for application in California. - V. S.

5. RADIOACTIVE METHODS

8877. Barbour, W. E., Jr. A statistically Accurate Scaling Method for Radioactivity Measurements. Instruments, Pittsburgh, Pa., vol. 19, No. 10, 1946, pp. 584-585.

The conventional method of measuring radioactive emanations comprises counting the impulses received during a period of time, dividing by the time, and computing the statistical error with formulas or charts. A new method is offered utilizing a different procedure: Impulses from the Geiger-Müller counter are fed to a preamplifier, a two-stage amplifier, and a multivibrator, which triggers the first of a series of twelve "scale-of-two" counter circuits. The latter can be selected by a switch to provide a predetermined number of impulses in integral powers of 2. Thus, the measurement of an average counting rate is made by timing a finite number of random impulses, and the statistical error can be determined for the total number of impulses timed.

A chart shows the statistical error as a function of the ratio of the total counting rate to the background counting rate plotted for different settings of the scale-selector switch of the apparatus. - V. S.

8878. Campbell, J. L. P., and Samuell, J. H. Pre-Permian Radioactivity Surveys in West Texas and New Mexico. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 12, No. 3, 1946, pp. 20-23.

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By combining the information furnished by the gamma ray and neutron curves, reliable subsurface data can be obtained under unfavorable conditions that preclude the use of other means without expensive preparatory work. The employment of both curves in radioactivity logging operations in west Texas and New Mexico is here discussed. - Authors' abs.

8879. Curtiss, L. F., and Brown, B. W. An Arrangement with Small Solid Angle for Measurement of Beta Rays. Jour. Res. Nat. Bur. Stand., Washington, D. C., vol. 37, No. 2, 1946, pp. 91-94.

An arrangement using a Geiger-Müller counter with small aperture, with a radioactive source at some distance from it, for counting beta particles is described. Sources emitting only beta rays with maximum energies above 1 million electron volts of the order of 1 milli-curie can be measured in terms of the disintegration rate from the observed counting rate and the solid angle as calculated from the dimensions of the apparatus. An independent check of the arrangement shows that this can be done reliably. A suggestion for discarding the use of the curie and substituting a unit consisting of 10^6 disintegrations per second, to be called the "rutherford," is made. The curie is properly applicable only to members of the radium family. - Authors' abs.

8880. DeMent, Jack. Locating Uranium with the Ultraviolet Lamp. Min. Congr. Jour., Washington, D. C., vol. 32, No. 5, 1946, pp. 26-30.

The ultraviolet lamp is proving useful in uranium prospecting. It has led to the discovery of deposits of uranium, zippeite, schoepite, dakeite, and opaline silica. Generally, the primary uraninites imbedded in pitchblende and the columbium-titanium tantalates are nonfluorescent, but the secondary uranium minerals emit a brilliant glow. As the latter ores are frequently associated with the primary minerals, this differentiation can lead to their discovery. The various uranium minerals and the fluorescent tests for identifying them are discussed. - V. S.

8881. Hée, A. Effet d'épaisseur du thorium dans les roches. (The Effect of the Thickness of Thorium in Rocks.) Ann. Géophys., Paris, vol. 2, No. 1, 1946, pp. 55-67.

A study of the effect of the thickness of thorium-bearing substances and rocks upon electrometer measurements could assist in the interpretation of the results of radioactive surveys. Investigations made for various purposes have shown that this effect may serve for determining the presence of thorium in rocks, though not its amount. It is found, moreover, that some constituents of rocks, such as Fe components in certain chemical form, facilitate emanation and affect the accumulation of radioactive substances. Accordingly, preliminary measurements of emanation from rocks and their constituents likewise would aid interpretation. - V. S.

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8882. Kilkenny, J. E. Geological Interpretation of Radioactivity Well Logs (abs.) Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 25, 1946, pp. 110-125.

The nature of radioactivity and its varieties, such as alpha, beta, and gamma rays, are discussed. Gamma rays, being the most penetrating, provide the best means of detecting radioactive formations in boreholes. It is found that among sedimentary rocks the brown organic shales, rhyolitic ashes, and bentonites usually give high values, whereas sands, limestones, barren silts, and shales give low values.

Some results in the San Joaquin Valley, California, show, however, that the brown Kreyenhagen shales in the Coalinga and Helm oil fields can yield low radioactive values, possibly because of derivation from Franciscan rocks composed of basalt and serpentine. On the other hand, sporbo and phosphatic nodules in the basal Etchegoin beds of the Cymric oil field prove radioactive and register distinctly on logging curves. - V. S.

8883. McKellar, I. C. An Alpha-Ray Ionization Chamber for Radioactivity Measurements. New Zealand Jour. Sci. & Tech., Wellington, vol. 27B, No. 3, 1945, pp. 259-262.

A description is given of a semiportable ionization chamber serving to check field readings made in prospecting with the counting rate meter of McCahon (see Geoph. Abs. 125, No. 8560). For this purpose, measurements are made of total alpha-ray emission from the surface of sand or powdered rock samples. The apparatus employs a Lindemann electrometer with a fiber suspension connected to an electrode running along the center of an aluminum chamber. When a negative potential of 60 volts is applied to the outside of the chamber, while two nearly equal voltages of opposite sign are applied through high resistances to the electrometer's plates, the electrometer acts as a sensitive measurer of small changes of voltage on the central electrode.

For measurement, the samples are placed on an aluminum tray in the chamber, so as to ionize the air between the central electrode and the walls. The negative potential employed sweeps all positive ions to the walls before recombination can take place and produces a current causing a change of voltage on the central electrode that can be measured by the rate of movement of the electrometer needle. The construction of the ionization chamber and the method of measurement are described. - V. S.

8884. McLellan, A. G. Construction of Self-Quenching G-M Tubes. New Zealand Jour. Sci. & Tech., Wellington, vol. 27B, No. 3, 1945, pp. 263-265.

A Geiger-Müller tube was designed for service with the portable counting-rate meter developed by McCahon for radioactive prospecting (see Geoph. Abs. 125, No. 8560). With such requirements in view, a use was made of the fast, self-quenching type of tube, which is relatively unstable and affected by temperature but gives a plateau of as much as 250 volts. The tube contains argon and ethyl alcohol or helium and ethyl alcohol. The cathode is made of

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thin copper sheet fitting in a glass tubing measuring 0.75 inch in diameter. The central fiber and the lead from the copper cathode consist of 250 micron tungsten wire, the lead being pressed between the cathode and the inner glass surface.

The treatment of the copper cathode and the conditions of temperature and pressure necessary to prevent condensation of the alcohol are discussed. It is calculated that the number of pulses required to reduce the partial pressure of ethyl alcohol from initial to that least compatible with quenching is 2.5×10^8. Accordingly, at the normal rate of 150 counts per minute the tube should serve for 3 years of continuous operation. - V. S.

8885. Mercier, V. J. Radioactivity Well-Logs: Interpretation and Application. Oil Weekly, Houston, Tex., vol. 123, 1946, No. 7, pp. 56-60; No. 8, pp. 41-46.

The nature, application, and interpretation of radioactivity logs are discussed in the light of comparisons with electrical and other logs and examples of log curves and cross sections. Topics treated include gamma-ray curves, neutron curves, combination radioactivity logs, correlation with various types of data, relative accuracies, and general principles of logging. To aid interpretation, a schematic type log is given showing the characteristic responses of both the gamma-ray curve and the neutron curve to various types of strata encountered progressively from the surface down to the pre-Cambrian.

The applications of radioactivity logs include (1) locating cased-off strata, porous formations, permeability zones, physical features of wells, and radioactive additives such as carnotite and tracers; (2) clarifying uncertain anomalies, tops and bottoms of formations, and drill-pipe measurements; and (3) providing data for geological correlation. - V. S.

8886. Muehlhause, C. O., and Friedman, H. Geiger-Müller Counter Technique for High Counting Rates. (Abs.) Phys. Rev., Lancaster, Pa., vol. 69, Nos. 1/2, 1946, p. 46.

Counting rates of 100,000 per second have been measured with a self-quenching G-M counter operated at 50 to 100 volts above threshold. The counter was coupled to a video amplifier having linear response to four megacycles per second and a maximum gain between 10^3 and 10^4. The amplified pulses were counted by a scaling circuit capable of responding to uniform pulse rates up to two megacycles per second.

The triggered-sweep oscilloscope method devised by Stever to measure "dead time" was applied to the present combination of counter and amplifier. At amplifications under 10, a dead-time interval of 3×10^{-4} second was observed, in agreement with Stever's results. At higher amplifications, the dead-time pattern persisted, but pulses were observed within the dead-time interval. These latter pulses arise from impact ionization in the reduced fields that exist immediately following the formation of a positive ion sheath and make possible the high counting rates observed.

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8887. Pettersson, Hans. Manganese Nodules and the Chronology of the Ocean Floor. Göteborgs Kungl. Vetenskaps och Vitterhets-Samhälles Handlingar, ser. B, vol. 2, No. 8, 1943, 43 pp.

During the past 30 years the author investigated Joly's precipitation hypothesis and its implications as to the chronology of the ocean floor. The content of radium and related elements in ocean sediment-cores, manganese nodules, and sea water was measured. The results on the nodules are presented in tables and curves and are discussed. The following principal conclusions are reached: (1) The radium content in manganese nodules declines rapidly inward from the surface owing to disintegration of radium unsupported by its parent element ionium. (2) If the disintegration constant of radium is used as a measure of time, the rate of growth of the nodules is, on the average, 1 mm. in 1,000 year; the rate of sedimentation for samples of Red clay is about 0.5 mm. in 1,000 years. - V. S.

8888. Rada, F. D., de. Conferencias de radioactividad. (Lectures on Radioactivity.) Rev. Geofis., Madrid, vol. 4, Jan.-Mar. 1945, pp. 102-131.

This elementary course on radioactivity oulines the historical development of investigation, methods of measurement, determination of the radioactivity of mineral waters, and the numerical results of the measurement of certain Spanish mineral springs. - Bull. Analyt., CNRS, Paris, vol. 7, No. 6, pt. 1, 1946, p. 1053. Transl. by V. S.

Zeuner, F. E. Dating the Past: An Introduction to Geochronology. London, Methuen & Co., 1946, 444 pp. Price, $6.90. (See abs. 8937 in this issue.)

6. GEOTHERMAL METHODS

8889. Guyod, Hubert. Temperature Well-Logging: Heat Conduction. Oil Weekly, Houston, Tex., vol. 123, No. 8, 1946, pp. 35-40.

At present, temperature logs are used for locating oil and gas reservoirs in cable-tool wells, but an understanding of their possibilities could lead to broader application. Toward that end, the laws of heat conduction are compared with those of hydrodynamics and electrodynamics, in the light of the conductivity of substances and sediments. As a result, a method is devised for studying temperature distribution in the earth's crust by means of electrolytic scale models, in analogy with investigations of the performance of petroleum reservoirs.

In cases of formations with known spatial and thermal characteristics, the models must constitute close geometrical replicas and consist of elements with an electrical-conductivity ratio equal to the thermal-conductivity ratio of corresponding elements of the ground. The underlying assumptions are that

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electrical flow through conductors simulates heat flow through the earth's crust, and that potential distribution in the model simulates temperature distribution in the ground.

This method was applied for studying the influence exercised upon temperature distribution by salt domes, salt ridges, formation dip, superficial relief, petroleum reservoirs, ore deposits, faulting, and intrusions with low heat conduction. The construction of models and the organization of experiments are described. - V. S.

8890. Nichols, E. A. Geothermal Gradients in Mid-Continent and Gulf Coast Oil Fields. Petrol. Technology, New York, vol. 9, No. 6, 1946, AIMME Tech. Publ. 2114, 4 pp.

An attempt has been made to correlate geothermal gradients over considerable parts of the mid-continent and Gulf-coast regions. Approximately 1,800 measurements in 194 oil fields provided the data. They were made with maximum thermometers in conjunction with running pressures or taking reservoir fluid samples after the wells had been shut from 1 hour to 10 or 12 days, so that they represent thermal conditions found in producing wells. The resulting map is given and can serve for estimating temperatures.

The study has led to the following conclusions: (1) The region of New Mexico and western Texas is characterized by a low gradient basin; (2) near Matagorda Bay a plateau of high temperatures appears, but elsewhere along the coast the gradients increase inland; (3) above the coast on the Texas-Louisiana boundary a sharp change in gradients is evident, culminating in a high plateau near Beaumont; and (4) in the general vicinity of the Sabine uplift a large and irregular basin is apparent. (A digest appeared in Oil & Gas Jour., vol. 45, No. 22, 1946, p. 88.) - V. S.

7. GEOCHEMICAL METHODS

8891. De Ment, Jack. Black Light and Bacteria - New Tools for Petroleum Prospecting. Mineralogist, Portland, Oreg., vol. 13, No. 11, 1945, pp. 425-427.

Deep petroleum deposits give off emanations of hydrocarbon gases, which diffuse upward and are assimilated by certain bacteria in the ground. This process results in a deposition of fluorescent substance in the surface soil over the deposits. A new method of prospecting has been devised recently to make use of this phenomenon. Samples of the soil in the surveyed area are analyzed for the presence of certain kinds of bacteria and for fluorescent properties. If sampling is made with solvents, very accurate tests are possible. L. W. Blau obtained patent rights for the bacterial analysis (Geoph. Abs, 117, No. 7492). The fluorescent analysis has been described by the author elsewhere in greater detail (Geoph. Abs, 125, No. 8569). - V. S.

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8892. Gabriel, V. G. Geochemical Prospecting. Petrol. World, Los Angeles, Calif., vol. 43, No. 9, 1946, pp. 52-53.

In the search for oil, the initial principle employed was to look for surface seepages. Most of the pools discovered before 1900 were found near oil seepages or asphalt deposits. As examples, the Ventura, Sulphur Mountain, Coalinga, McKittrick, and Los Angeles pools in California are described. The modern method of geochemical prospecting applies the same principle of seepages but uses refined techniques and apparatus for identifying microseeps of hydrocarbon gases. Soil samples are taken at relatively shallow depths, not exceeding a few feet, to be analyzed in laboratories for diagnostic hydrocarbon constituents, concentration, ratio of weights, pattern of distribution, inorganic solids, etc., or else the rate of upward hydrocarbon drift through the soil is measured by means of special instruments in the ground. The approaches employed by Horvitz, McDermott, Rosaire, Smith, Pirson, Hoover, Washburn, and others are outlined briefly. - V. S.

8893. Mining Journal. Novel Russian Method of Prospecting for Oil. London, vol. 227, No. 5,799, 1946, p. 813.

In 1945, Russian geologists organized an expedition to the Stavropol region in the northern Caucasus to prospect for gas by a new bacterial method. A brief note reports that geochemical research before the war had led to identifying certain hydrocarbon bacteria invariably present in surface soils over petroleum and gas deposits but absent in other localities. Upon the basis of the findings then obtained, a method of prospecting was developed. When applied by the Caucasian expedition, it detected a gas deposit of commercial value at a depth of 682 feet near the village of Mikhailovskoe. - V. S.

8894. Van Tuyl, F. M., et al. Geochemical Prospecting (1945). Quart. Colorado Sch. Mines, Golden, vol. 41, No. 3, 1946, pp. 68-71.

The papers and patents published on geochemical prospecting during 1945 are reviewed briefly. They include the writings of Pirson, Horvitz, Bronson, Gabriel, Tripp, West, and the inventions of Hassler, Bies, Paton, McDermott, Zaikowsky, Metcalf, Roper, Horvitz, etc. Instances of new observations, broadened approaches, and modifications of previous methods are indicated. - V. S.

8. GENERAL GEOPHYSICAL SUBJECTS

8895. Bates, R. L. Developments in Arizona, Western New Mexico, and Northern New Mexico in 1945. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 6, 1946, pp. 958-962.

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In describing petroleum developments in Arizona and New Mexico, the author dwells briefly on the geological and geophysical work. Throughout 1945 and continuing into 1946, extensive geophysical exploration was carried on in the San Juan basin, New Mexico. It consisted of seismic, magnetic, and torsion-balance surveys and was aimed particularly at determining the possibilities of the Paleozoic limestones at great depths. A considerable drilling campaign is expected. - V. S.

8896. Bonine, C. A. Exploration for Petroleum and Natural Gas. Pennsylvania State College, School of Mineral Industries, "Petroleum and Natural Gas Production," vol. 2, 1946, pp. 170-201.

The textbook by M. Stephens and O. Spencer on petroleum and natural-gas production contains a section by C. Bonine on exploration. The latter covers surface indications, geophysical, geochemical, and logging methods, and geological interpretation. Attention is devoted particularly to electrical, magnetic, gravitational, and seismic prospecting. The other subjects considered are seepages, outcrops, hydrocarbon veins, mineral waters, gas and soil analyses, electrical and other logs, stratigraphic correlation, and structural interpretation. The treatment is aimed primarily at preparing students for work in Pennsylvania. - V. S.

8897. Borden, J. L. Developments in Oklahoma in 1945. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 6, 1946, pp. 902-911.

This account of petroleum work in Oklahoma during 1945 includes a brief summary of the use of geophysical methods. Such use increased both in amount and range, comprising seismic, gravitational, magnetic, and radioactivity surveys. Total performance amounted to 772 crew months as against 559 for 1944, a gain of 38.3 percent. Seismic work alone increased 163 crew months, or 35.6 percent; gravimetric work increased 35 crew months, or 48.6 percent. A table gives the statistics of exploration reported for 1941 through 1945. - V. S.

8898. Centre National de la Recherche Scientifique, France. Bulletin Analitique. (National Center of Scientific Research. Analytical Bulletin.) Service de Documentation du CNRS, Paris, pt. 1, 1939+.

This monthly periodical is an annotated bibliography of scientific literature appearing in various countries. It is published by the French ministry of education through the documentation service of the National Center of Scientific Research. Some subdivisions contain entries on geophysical exploration and related subjects, in particular the sections of Physics of the Globe, Electricity and Magnetism, and Geology (including Applied Geology). The entries are made in the original language and in French, with French notations. They have numbers serving for identification in ordering microfilm copies of full texts made by the documentation service at stated prices. The service also undertakes to supply microfilms of texts published prior to the founding of the Bulletin Analytique in 1939. - V. S.

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8899. Davis, D. M., and Beilharz, C. F. Developments in the Upper Gulf Coast of Texas in 1945. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 6, 1946, pp. 991-998.

The petroleum developments on the upper Gulf coast of Texas in 1945 included geophysical exploration. A brief summary of the latter work shows activities totaling 1,640 crew weeks, a decline of 8 percent from 1944. Seismic exploration alone amounted to 1,347 crew weeks, a decrease of 5.2 percent; gravity exploration to 293 crew weeks, a decrease of 19.3 percent. However, most of the new-field wildcats resulting in new discoveries were drilled on seismic prospects. In Colorado County, 6 out of 8 such wildcats revealed gas-condensate fields. Geophysical activity was distributed more or less evenly over the entire upper Gulf coast. - V. S.

8900. Dawson, Herbert. The Planning of a Foreign Geophysical Operation. Geophysics, Tulsa, Okla., vol. 11, No. 4, 1946, pp. 435-442.

The advance preparation necessary for a properly conducted foreign geophysical operation is discussed, with reference also to the economic facts involved that emphasize the necessity of having proper equipment and an efficient supply system. - Author's abs.

8901. Day, A. H. Continuing Search for Oil in Britain. World Petrol., New York, vol. 17, No. 10, 1946, pp. 47-49.

This account of oil search in Britain includes brief references to the use of geophyscical methods. Seismic surveying contributed a part of the evidence which lead to the discovery of the Eakring oil fields in Nottinghamshire in 1939. Various geophysical methods combined with geological study were employed in Yorkshire and Midlothian, with discoveries in the latter district. Geophysical work revealed a dome in the peat country at Belton, Doncaster, which contained light oil, though not in commercial quantity. At present, geophysical surveys are in progress in Wiltshire, Dorset, and Hamshire, including parts of Salisbury Plain and the New Forest. From a commercial angle, the various results to date do not appear to justify the expense. - V. S.

8902. Dresbach, C. H., and Weaver, Paul. A Review of Geophysical Methods, Devices, and Procedures. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 26, 1946, pp. 79-81.

In every part of the United States where oil fields exist, geophysical prospecting has been tried. The choice of territory to work was at first geographic. In most regions no attention was paid, at the beginning of the campaign, to the suitability of the geophysical method tried for the kind of structure that was most promising for oil, and therefore the initial campaign in many areas resulted in disappointment.

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In the Gulf Coast, where the initial campaign was for a plug structure, the salt dome, and where the methods used were suitable to plugs, gravity, and refraction seismograph, the finding rate was high, and the campaign therefore expanded continuously. In other oil-producing areas, a successful campaign was firmly established only when the geophysical method utilized was particularly useful for the kind of local structure in which oil chances were best. - Authors' abs.

8903. Eby, J. B. The Status of Geophysics. (Abs.) Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, p. 418.

Geophysical exploration has advanced steadily and successfully since its introduction in this country in 1923 to the present time. It was during the first decade that the exploration program was divided nearly equally between the larger oil companies and the larger independent geophysical organizations. During the second decade, 1933 to 1943, there was a very pronounced tendency to increasingly subdivide the largest geophysical organizations into many small independent exploration companies. This tendency for experienced geophysicists to branch off from the larger oil company staffs and of the larger geophysical organizations to form their own companies existed until about a year or so ago.

At present there is, in the writer's opinion, a need for greater consolidation of geophysical thinking and organization rather than further breaking apart into smaller and smaller exploratory units. The time has come when more and more cooperation is urgently needed to advance the science as a whole. Some way should be devised whereby the smaller, substantial, operating geophysical organizations would have a better opportunity of sharing in progressive research methods and equipment. If mistakes are made by the smaller organizations as a result of a lack of this contact, the damage done affects adversely not only the organization involved but the entire science of applied geophysics as well. - Abridged by V. S.

8904. Gabriel, V. G. Geophysical Prospecting Methods. Petrol. World, New York, vol. 43, No. 7, 1946, pp. 46-47.

The usefulness, proper application, and small per-barrel cost of indirect geophysical methods of exploration, magnetic, gravimetric, seismic, is discussed and illustrated by a few statistics. Brief mention then is made of the methods of direct oil detection: (1) geochemical, (2) electrical resistivity, Resistolog, Elflex, (3) radio and high-frequency, and (4) polarization at very low frequency, used by Potapenko. - V. S.

8905. Heroy, W. B. Foreign Geophysical Activities. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 385-387.

Statistics on foreign geophysical exploration compiled by the U. S. Petroleum Administration for War are given for the second half of 1944 and

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the first half of 1945, with revised figures for 1944 (Geoph. Abs. 121, No. 8019). The data cover (1) Mexico, Central America, West Indies, (2) Caribbean region, (3) other South America, and (4) Eastern Hemisphere; they do not include Canada, Argentina, or Russia. The total number of crews rose from 122 in the second half of 1944 to 148 in the first half of 1945. The Western Hemisphere carried about 95.6 percent of the foreign activity, with 61.9 percent in the Caribbean and 19.8 percent in Mexico, Central America, and West Indies. About two-thirds of the investigations continued to be seismic and the rest almost entirely gravimetric. The activity in foreign countries in 1945 was approximately 13 percent of the activity in the United States, the latter having averaged 561 crews during each of the first two quarters of 1945. - V. S.

8906. Jung, Karl. Die geophysikalische Erforschung des Untergrundes. (The Geophysical Exploration of the Subsurface.) Natur, Volk, Frankfurt, vol. 10, October 1943, pp. 494-506.

Geophysical methods of exploration based upon measurements of gravity, geomagnetism, and electricity are examined with the aid of numerous and precise examples. Brief consideration is given to procedures making use of radioactivity and temperature in the earth. A bibliography is appended. - Bull. Analyt., CNRS, Paris, vol. 7, No. 4, pt. 1, 1946, p. 632. Transl. by V. S.

8907. Mining Journal, London. Submarine Oil Deposits. Vol. 227, No. 5,786, 1946, p. 553.

Pursuant to the presidential declaration claiming the continental shelf for the U. S. Government, the Secretary of the Interior has instructed the U. S. Geological Survey to make recommendations for a survey of the submerged areas, comprising a total of 750,000 square miles. The applicable geophysical approaches include magentic, gravimetric, and seismic methods. Surveys of submerged areas have been made already. The promising parts of the continental shelf are the Gulf of Mexico and areas off the Pacific and Alaskan coasts. - V. S.

8908. Petroleum Times. Oil Resources of the British Empire and Mapping by Radar. London, vol. 50, No. 1,283, 1946, pp. 1,008-1,010.

Brief reviews are given of papers on petroleum presented at the recent Empire Scientific Conference on Natural Resources held in London. (1) E. O. Macpherson in "Detailed Geological Mapping and New Zealand Mineral Resources" referred to geophysical exploration in 1939-43; gravity and seismic reflection surveys made in the three main sedimentary basins in combination with other studies revealed an entirely different structural picture from that supposed hitherto. (2) C. A. Hart in "Surveying from Air-Photographs Fixed by Remote Radar Control" and "Modern Mapping" described the use of radar aerial positioning techniques for establishing networks of fixed points on the ground,

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relative to which aerial photographs could be plotted in map making. Trial maps of some areas in Great Britain have been made by this method, and radar controls are now employed in aerial surveys in West Africa. - V. S.

8909. Schlumberger, R. A. Relations entre la tectonique et la morphologie de la plaine du Rhin en Alsace et au Grand Duché de Bade. (Relations between the Tectonics and Morphology of the Plain of the Rhine in Alsace and the Grand Duchy of Baden.) Bull. Soc. Géol. France, Paris, vol. 15, Nos. 1-3, 1945, pp. 69-80.

Different modes of investigation are described in their application to the tectonics and morphology of the valley of the Rhine in Alsace and the Grand Duchy of Baden. They include such studies as geological, geophysical, alluvial, morphological, aerial micrometeorological, and Hertz-wave transmission for identification of subsurface structures. A bibliography is appended. - Bull. Analyt., CNRS, Paris, vol. 7, No. 4, pt. 1, 1946, p. 632. Transl. by V.S.

8910. Science Museum, London. Quarterly Bibliography of Applied Geophysics. Science Library, Current Bibliography Series No. 1, 1938+.

The science library of the Science Museum, London, issues a Current Bibliography Series. Its first section since 1938 is devoted to a quarterly bibliography of applied geophysics, a mimeographed publication listing writings and patents from various countries, with their decimal classification. The entries give author's name, title of paper, source, and year of publication. - V. S.

8911. Standard of California. Through Water to Oil. San Francisco, Calif., vol. 32, Spring Bull., 1945, pp. 6-7.

Geophysical surveys have detected three oil fields in the swampy bayou country of lower Louisiana. In exploration, the California Company employed marsh buggies mounted on wheels of huge, air-tight, steel drums traveling on land and water and air boats driven by an airplane propeller at the stern and sliding undamaged over grass mounds, logs, and other obstacles. The drilling of wells is done from large steel barges sunk to a solid foundation. - V. S.

8912. Targhetta, J. B. La geofisica y su relacion con la geologia. (Geophysics and Its Relation to Geology.) Rev. Geofis., Madrid, vol. 4, Apr.-June 1945, pp. 208-218.

The application of modern geophysical methods in prospecting the subsurface is outlined, with indication of their superiority over mechanical sounding. Geophysical findings are compared with geological data in the light of some results obtained in Spain, particularly in the solution of structural problems. - Bull. Analyt., CNRS, Paris, vol. 7, No. 6, pt. 1, 1946, p. 1054. Transl. by V. S.

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8913. Uren, L. C. Petroleum Exploration Methods, Well Logging Methods and Records. In the book by the same author: Petroleum Production Engineering, vol. 1, Oil Field Development, New York, McGraw-Hill Co., 1946, pp. 34-53, 618-666.

This book on oil-field development includes sections on geophysical exploration and well logging. Consideration is given to geological reconnaissance and surveying, aerial mapping, prospecting by gravimetric, magnetic, electrical, radioactive, and geochemical methods, drilling for subsurface information, electrical logs, radioactivity logs, geochemical logs, instrumental logs, drilling-time logs, caliper logs, and thermal surveys of wells. A bibliography is appended. - V. S.

8914. Ver Wiebe, W. A. Exploration for Oil and Gas in Western Kansas During 1945. Geol. Surv. Kansas, Lawrence, Bull. 62, 1946, 112 pp.

The amount of exploratory geophysical work done in 1945 was not as great as that reported for the previous year. Only a few of the 35 new pools found in western Kansas are credited to such geophysical work. Most of them were found by the intelligent application of subsurface data derived from other test wells. - Author's abs., abridged by V. S.

8915. Yacimientos Petroliferos Fiscales (Argentina). Memoria de Y.P.F. correspondiente al año 1944. (Annual Report of the Argentine Administration of Government Oil Fields for 1944.) Bol. Inform. Petrol. (YPF), Buenos Aires, vol. 22, No. 255, 1945, pp. 323-328.

The Argentine Administration of Government Oil Fields (Y.P.F.) has issued an annual report for 1944 containing a section on geological and geophysical exploration. Geophysical surveys were made in the provinces of Buenos Aires, Mendoza, San Juan, Rio Negro, Chubut, Neuquen, and Santa Cruz over a total area of 154,587 km^2. They covered, particularly, unexplored areas and employed gravimetric, magnetic, and seismic refraction methods; the detailed work was made by seismic reflection. The results are considered satisfactory, having revealed promising anomalies justifying further study. The material presented is organized by provinces. - V. S.

9. RELATED NON-GEOPHYSICAL SUBJECTS

8916. Aslakson, C. I., and Rice, D. A. Use of Shoran in Geodetic Control. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 459-463.

A general description of the shoran equipment is given, with a discussion of the various factors that influence accuracy of a direct distance measurement

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made by determination of the travel time of a radio signal. The line-crossing method of observation is explained, and problems arising in the computation and adjustment of a shoran triangulation scheme are enumerated briefly. A table summarizes results obtained in recent accuracy test simulating field conditions to be found in the execution of geodetic control by shoran. - Authors' abs.

8917. Baldini, Ugo. In tema di allineamenti. (On the Subject of Alignment.) Metano, vol. 4, No. 15, 1942, pp. 5-11.

The hypothesis that oil and gas deposits usually are alined in linear fashion has lead to the discovery of a new gas reservoir near Mogginano, in Arezzo Province, Italy. This reservoir is situated on a straight line between the well-known deposits near Bagno di Romagna and Camerelle. - V. S.

8918. Beck, R. S. Highlights of Washington and Oregon Biostratigraphy. (Abs.) Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 27, 1946, p. 92.

The biostratigraphy of type and classical localities of Washington and Oregon is discussed. Special emphasis is given to the Astoria, Cowlitz, Olympic Peninsula, and Coos Bay basins. Strata from Devonian to recent are known from these areas and have a combined thickness of over 30,000 feet. These basins, as well as others, are possible areas in which oil and gas might be discovered in the future. Favorable as well as unfavorable geologic conditions with regard to oil possibilities in the Pacific northwest are discussed.

8919. Canadian Legion. Prospecting in Canada. Educational Services, Mining Textbooklet 2, Ottawa, 1945, 166 pp. Price $1.

This vocational course in prospecting, published for service personnel as a part of a series on mining, deals in an elementary and practical fashion with questions of camp necessities, prospecting equipment, selection and exploration of an area, examination and development of a prospect, and special types of mineral and petroleum deposits. Among prospecting instruments, the dip needle and ultraviolet lamp are listed. A glossary and bibliography are appended. - V. S.

8920. Dutilly, Arthemc. Bibliography of Bibliographies on the Arctic. Catholic Univ., Washington, D. C., 1945, 47 pp. Price $1.

This bibliography of bibliographies deals with the Arctic, defined as the region circumscribed by the 10° C. (50° F.) isotherm for July, which corresponds to the limit of forests rather than to the Arctic Circle proper (66° 30' N.). The material consists of some 650 entries in English, German, French, Russian, Swedish, etc., and covers, among other subjects, geology,

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cartography, and oceanography. Two accessory lists are appended to facilitate finding entries: (1) Arctic Sectors and Districts, and (2) Prominent Names in Arctic Exploration. - V. S.

8921. Gross, H. E. Possibilities and Problems of Drilling Beyond the Continental Shelf. Petrol. Technology, New York, vol. 9, No. 6, 1946, AIMME Tech. Publ. 2095, 7 pp.

An abstract appeared in the Oil & Gas Journal, Tulsa, Okla., vol. 44, No. 43, 1946, pp. 57-58. (See Geoph. Abs. 125, No. 8602.)

8922. Illing, V. C. Geology Applied to Petroleum, pts. 1-5. Oil Weekly, Houston, Tex., vol. 122, 1946, No. 7, pp. 34-36, 42, No. 13, pp. 30-33, 37; vol. 123, 1946, No. 1, pp. 27-30, No. 3, pp. 174-176.

This discussion of the role of geology in petroleum exploration comprises four installments: (1) Petroleum in the Sedimentary Cycle treats of the origin of petroleum, phases of sedimentation, effects of diastrophism, accumulation of oil, and the anticlinal theory. (2) Types of Regional Structure describes the trapping of oil, areas of closure, faulting and thrusting, oil fields associated with salt domes, and oil fields of unusual types. (3) Oil Recovery and Exploration deals with prospecting methods, oil dispersal, oil recovery, and geology in exploitation. (4) Finally, Influence of Oil on Geology is concerned with the quantitative approach, geologic forms related to oil, development of applied geophysics, advances in geological methods of oil exploration, etc. - V. S.

8923. Jenkins, D. S., et al. The Origin, Distribution, and Airphoto Identification of United States Soils. Civil Aeronautics Administration, Tech. Develop. Rep. 52, 1946, 202 pp., 63 airphoto plates.

The soils of the United States are examined with a view to developing information and airphoto techniques for soil identification in engineering work. The types of soils and materials studied include residual, loessial, glacial, and waterlaid, as well as nonsoil types. Attention is then devoted to the principles of airphoto analysis and interpretation as applied to the classes of soils and such of their subdivisions as sedimentary rocks, metamorphic rocks, intrusive rocks, extrusive rocks, loess, sand dunes, moraines, tilt planes, etc. The discussion of techniques of airphoto analysis is illustrated by 63 plates of aerial photographs of soils. - V. S.

8924. Krug, J. A. Federal Policy on Petroleum Exploration and Conservation. U. S. Department of the Interior, Office of the Secretary, mim. text, 1946, 8 pp.

The Secretary of the Interior delivered an address at the quarterly meeting of the Interstate Oil Compact Commission held in Grand Rapids, Mich.,

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on August 10, 1946. In emphasizing the need for oil exploration and conservation, the Secretary said in part: "We must continue to increase and make available our knowledge of reservoir behavior, develop and utilize new techniques of exploration, and further the growing interest in secondary recovery operations of all types." (Reviews appeared in Oil & Gas Jour., vol. 45, No. 15, 1946, pp. 67-68, and Nat. Petrol. News, vol. 38, No. 33, 1946, pp. 41-44.) - V. S.

8925. Lovely, H. R. Geological Occurrence of Oil in United Kingdom with Reference to Present Exploratory Operations. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 9, 1946, pp. 1444-1516.

In the United Kingdom, oil indications occur over much of the stratigraphical column, particularly in Carboniferous and Jurassic rocks, and are commonly found in close and apparently genetic association with non-marine sediments. Suitable stratigraphical and structural conditions for oil pooling exist in southern England and east-central England, but widespread testing has proved commercial production only from the English equivalent of the lower Pottsville, Pennsylvanian system, in the latter region. It is concluded that the oil prospects of the United Kingdom are definitely restricted both stratigraphically and areally by reason of the geological factors which have together contributed to its development. More pools may be found but nothing of large dimensions is expected. - Author's abs., abridged by V. S.

8926. Lyon, Duane. Automatic Map-Plotting Instruments. Photogrammetric Engineering, Menasha, Wis., vol. 12, No. 3, 1946, pp. 315-340.

This paper deals with automatic map-plotting instruments of the Deville type developed in the United States, such as the original Deville Plotter, Cooke's Model 1, Stereotopograph, K. E. K. Plotter, Mahan Plotter, Multiscope, and Lyon Models 1, 2, and 3. The apparatus are described analytically with illustration by schematic drawings, and their general features are discussed as regards common characteristics, necessary geographical data, plotting accuracy and speed, control interval, and cost of compilation. In order to obtain the customary vertical accuracy, theoretically the flying height should not be greater than about two thousand times the desired contour interval, and the stereoscopic overlap not greater than 60 percent, butthe present limitations of equipment and method generally make a ratio of 1,000:1 for interval to flying height necessary. - V. S.

8927. Military Service Publishing Co. Map and Aerial Photograph Reading - Complete. Harrisburg, Pa., 2nd rev. ed., 1945, 216 pp. Price $1.

This book aims to give complete directions on map and aerial-photo reading for field use conformable with the requirements of the U. S. Army. The contents comprise information from official Army manuals, and texts on foreign maps and map projections, with illustration by numerous drawings, different types of

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maps, aerial photographs, graduated protractors, and a photo-coordinate and grid-coordinate card. Some of the questions treated have a bearing on the use of geological maps and aerial photographs in prospecting. - V. S.

8928. Oppenheim, Victor. Geologic Outline of South American Oil Fields. Pan Amer. Inst. Min. Eng. & Geol., U. S. Sec., Tech. Paper 4, 1946, 35 pp.

The geology and structure of the principal South American oil fields and sedimentary basins are outlined. The countries covered include Argentina, Chile, Uruguay, Paraguay, Bolivia, Brazil, Peru, Ecuador, Colombia, and Venezuela. Reference is made to the geophysical work performed.

In all, there are at present 13 major geological oil-bearing regions. About 90 percent of production comes from Tertiary formations of Pliocene to Eocene age. The greater part of the source rocks is also of Tertiary age. Structurally, the oil accumulations now developed are controlled mainly by Meso-Cenozoic Andean foldings. Future reserves can be expected along the Andean front ranges, in stratigraphic traps east of the Andes, and in some Tertiary coastal plains. A map of Tertiary basins and oil fields is given. - V. S.

8929. Peyton, Garland. Progress of Oil Search in Georgia. Oil Weekly, Houston, Tex., vol. 123, No. 3, 1946, pp. 92-96.

Exploration for oil and gas on the coastal plain of Georgia reached an all-time peak during 1945 and continued high in 1946. It has included geological and geophysical work, the latter being considered responsible for the selection of sites offering the greatest promise. The local geological problems and drilling results are discussed and illustrated by a geological map of Georgia, a west-east cross section through wells from Early County to Wayne County, and a generalized columnar section of the Georgia coastal plain. - V.S.

8930. Pratt, W. E. Petroleum on the Continental Shelves. (Abs.) Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 27, 1946, p. 92.

The problem of petroleum resources on the continental shelf challenges first the geologist, then the engineer. The geologist's immediate and pressing responsibility is to review his accumulated knowledge of the character of the continental shelf and to measure the adequacy of the reward that awaits the conquest of petroleum under the submerged shelves. In reply to this challenge, it is submitted that if one of the normal functions of the earth has been the generation of petroleum, much greater volumes of it than are now believed to exist beneath the land areas should have been formed through the ages. The most likely place to search for these possible additional stores of petroleum is the continental shelf. (A brief summary appeared in Oil & Gas Jour., vol. 45, No. 28, 1946, p. 159.) - Abridged by V. S.

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8931. RCA Manufacturing Co. Bibliography on Supersonics. Victor Division, Camden, N. J., 1942(?), 52 pp. (mimeographed).

This bibliography lists technical papers and articles on supersonics published in a wide range of periodicals in the fields of physics, chemistry, biology, and engineering, in the English, French, German, Italian, and Russian languages, up to and including 1941. - V. S.

8932. Reed, J. C. Recent Investigations by U. S. Geological Survey of Petroleum Possibilities in Alaska. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 9, 1946, pp. 1433-1443.

In 1944-45, the U. S. Geological Survey conducted exploration of oil in Alaska. Three large regions were found promising: Gulf of Alaska area, the Alaska Peninsula-Cook Inlet area, and northern Alaska. Sources of oil are believed to exist, respectively, in Tertiary rocks, Triassic limestone, and Cretaceous rocks. The geology of the regions is outlined, and the chances of significant oil discoveries are discussed. The text is illustrated by sketch maps and photographs. - V. S.

8933. Rittenhouse, Gordon. Grain Roundness - A Valuable Geologic Tool. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 7, 1946, pp. 1192-1197.

The roundness of heavy minerals can be a valuable tool in oil and gas exploration and other geologic work. In the Appalachian Basin, roundness has been used to differentiate producing zones, outline petrographic provinces, and help to interpret geologic history. Examples are presented. - Author's abs.

8934. Scientific American. Shoran Maps. New York, vol. 175, No. 3, Sept. 1946, p. 110.

The U. S. Coast and Geodetic Survey is conducting tests of aerial short-range (shoran) mapping at Buckley Field, Colorado. In operation, a shoran-equipped plane sends 20 short-wave radio pulses per second to two ground stations; these transmit them back to the plane, producing visual signals on a cathode-ray screen in front of the operator. A third signal on the screen represents the plane. The operator adjusts the controls until the three signals merge into one, at which instant the exact distances to the ground stations are shown on two dials and are photographed by a camera. Simultaneously, another camera photographs the ground below. The combined records supply the data for drawing maps. Shoran accuracy in locating a point is estimated to be within 10 feet over a range of 300 miles. - V. S.

8935. Varnes, D. J. Geologic Mapping by Means of Graphic Locator. U. S. Geological Survey, Washington, D. C., Circular 12, 1946, 6 pp.

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The graphic locator simplifies field work in geological mapping. It consists of a rectangle of xylonite about 3 inches square with two scales marked on the under side. Used in conjunction with a surveying alidade, this instrument eliminates the need of a stadia rod in determining the position of any point on a topographic map, so that points inaccessible with a rod can be located, and the mapping of loose surface material can be expedited accurately and rapidly. The degree of accuracy possible in determining position and the inherent errors are discussed, and the procedure of using the locator is illustrated by an example. - V. S.

8936. Wiener, P. F. German for the Scientist. Chemical Pub. Co., Brooklyn, N. Y., 1946, 238, pp. Price, $3.50.

This is the type of book needed by scientific students and research workers who desire to obtain, in as brief a period as possible, a reading knowledge of German scientific literature for research, development, or engineering work. It has a simple and direct method of approach without too much entangling grammer.

Part 1 gives a brief summary of grammatical and construction difficulties, and the elements of scientific German, with useful hints to avoid these difficulties. Parts 2 and 3 embrace passages from scientific literature, chiefly from physical and chemical works, but of broad scientific value. Part 4 contains the translations of the passages in parts 2 and 3. A 33-page vocabulary is at the end. - Econ. Geol., vol. 41, No. 5, 1946, p. 558.

8937. Zeuner, F. E. Dating the Past: An Introduction to Geochronology. London, Methuen & Co., 1946, 444 pp. Price, $6.90.

This book represents a first attempt to combine the diverse geological, botanical, zoological, and physical methods of dating the past into one discipline, geochronology. The tree-ring analysis, varved-clay analysis, astronomical theory of the ice-age, and other approaches are considered. One section is devoted to a brief review of radioactive methods; a diagram shows the results of the lead method. Another section deals with the duration of geological periods and the time-rates of geological processes. The chronological findings obtained by the different methods are summarized in numerous tables. - V. S.

8938. ZoBell, C. E. Functions of Bacteria in the Formation and Accumulation of Petroleum. Oil Weekly, Houston, Tex., vol. 120, No. 12, 1946, pp. 30-34.

The API Research Project 43A at the Scripps Institution of Oceanography, California, is aimed at determining the conditions of petroleum formation with a view to aiding oil exploration. The method consists in studying stratigraphically the transformation of organic matter in recent marine sediments, particularly that produced by bacteria. The results to date show that there are several ways in which bacteria may have been instrumental in the formation

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and accumulation of oil. (1) Bacteria produce hydrocarbons and hydrogen; the latter may contribute to the hydrogenation of organic matter, to methane formation, and to sulfate reduction. (2) Bacteria of the lipolytic variety hydrolyze fats and convert fatty materials into substances closer to the hydrocarbon type. (3) Certain bacteria attack and modify crude oil by the preferential oxidation or transformation of petroleum hydrocarbons. (4) Finally, bacteria create reducing conditions in sediments and liberate oil from their surfaces. These activities contribute in different ways to the formation, preservation, transformation, and accumulation of oil. Some of the processes are outlined. - V. S.

10. PATENTS

(The figure in parentheses refers to the class in which the entry stands; see list in the table of contents.)

8939. (1) Inrichting voor het meten van de verticale componente van den zwaartekracht. (Device for Measuring the Vertical Component of the Force of Gravity.) Standard Oil Development Co., New Jersey. Dutch Patent 49,362, issued October 15, 1940.

A gravimeter, comprising a body with a vertical and a horizontal arm attached thereto, provided with weights, which is supported rotatably about a shaft perpendicular to the arms. The body is freely carried by two spiral springs adjustably located in the axis of rotation. A spring is provided for returning the system to a position of equilibrium, whose measured tension or torsion is an index of the force of gravity. Two fixed points are arranged, allowing a limited movement of arms between them, with the position of equilibrium included. - Claims allowed, 3.

8940. (2) Method for Locating Permeable Formations Traversed by Boreholes. J. E. Walstrom, Houston, Tex., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,401,280, issued May 28, 1946.

A process for locating permeable formations traversed by an uncased bore hole containing a column of liquid, comprising adding to the bore-hole liquid a substance having magnetic properties whose presence can be detected readily, maintaining a sufficiently high hydrostatic pressure in the bore hole to cause said liquid to invade permeable formations traversed by said bore hole, and deposit at said permeable formations a higher concentration of said substance than at other zones along said bore hole, and moving along said bore hole a device for detecting magnetic phenomena to locate the formations having such higher concentrations of said substance. - Claims allowed, 6.

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8941. (2) Means for Installing Magnetic Detecting Devices and Supports Therefor. J. F. G. Miller, South Arlington, Va., and Richard MacHenry, Washington, D. C. U. S. Patent 2,405, 595, issued August 13, 1946.

A device of the character disclosed for arranging a magnetometer support within the bed of a body of water, said support having an aperture therein, the combination of a tubular member sealed at the upper end thereof and having a water inlet connected thereto, means for detachably securing said support in sealed relation to said tubular member, means for forcing water through said inlet and through said aperture within the support thereby to cause the support to be embedded within the bed of said body of water to a predetermined depth with the axis of the support vertical, and means operable at will from the surface of the water for detaching the tubular member from said support without disturbing the axis of the support from the vertical or changing the depth to which the support has been embedded within said bed. - Claims allowed, 14.

8942. (3) Method of Seismic Surveying. Conrad Reichert, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,384,851, issued September 18, 1945.

A method of propagating seismic waves in subsurface surveys, which includes the steps of locating a solid explosive charge and a blasting cap in a shot hole of substantial depth, plugging the hole adjacent the upper end only, so as to leave the major portion of the hole above the charge unobstructed, and firing the cap, whereby ejection of solid material from the hole by the exploding charge is delayed for a period which is at least sufficient to permit the reception and recording of the significant seismic impulses prior to the reception of disturbances resulting from such ejection, and whereby the hole may readily be cleared for the loading therein of another explosive charge. - Claims allowed, 1.

8943. (3) Seismic Apparatus and Method. O. S. Petty, San Antonio, Texas. U. S. Patent 2,408,478, issued October 1, 1946.

In a portable seismometer of the type employing elements which are readily displaceable on application thereto of seismic wave energy, in combination, a housing, an element rigidly supported in the housing, a second element supported in the housing for movement relative to said first element, and means mounting said second element to permit such relative movement, said means including a steady-mass carrying said second element, said steady-mass being hinged to the housing on an axis laterally spaced from said elements, the hinged axis being disposed substantially in the horizontal plane containing the center of gravity of the steady-mass, whereby the seismometer is unresponsive to horizontal components of seismic waves. - Claims allowed, 19.

8944. (4) Method and Apparatus for Simultaneous Determination of Various Properties of the Subsoil. C. B. Aiken, North Plainfield, N. J.,

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assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,398,761, issued April 23, 1946.

A method of investigating simultaneously a plurality of different subjects of interest in a bore hole, which comprises producing a first group of superimposed alternating currents of different frequencies at the surface of the earth, transmitting said superimposed currents to a given location in the bore hole, utilizing said superimposed alternating currents at said location in the bore hole to provide a group of superimposed alternating-current values which are different in frequency from each other and from the currents of said first group and each of which is a function of a subject under investigation, transmitting said group of superimposed alternating-current values to the surface of the earth, and separately obtaining indications of each of the alternating current values in said group. - Claims allowed, 17.

8945. (4) Electric Ratiometer. E. C. Klepp, Cricklewood, London, England, assignor to S. Smith & Sons (England), Limited, a British Company. U. S. Patent 2,400,308, issued May 14, 1946.

A moving-coil electric instrument comprising two magnet poles spaced apart, a core disposed between the poles so as to provide gaps between it and the poles, two coils arranged side by side and encircling said core with their side stretches in said gaps, a rotatable mounting for said coils arranged to permit rotation of said coils about an axis substantially parallel to the plane of the coils, which coils are wound so as to transmit opposing torques to said mounting, which core is provided with a cylindrical outer surface having its axis coincident with the axis of rotation of the coils, and provided with a second surface so intersecting said cylindrical surface that the axial depth of the latter varies around its circumference, whereby varying lengths of the side stretches of the coils cut the magnetic field in moving through said gap. - Claims allowed, 5.

8946. (4) Method of and Apparatus for Investigation of Cased Drill Holes. Jacob Neufeld, Tulsa, Okla., assignor to Well Surveys Incorporated, Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,400,593, issued May 21, 1946.

An electrical process for determining the nature of the geological formations traversed by cased drill holes comprising transmitting electrical current through the earth between casings of two drill holes and determining the distribution of the said current as a measure of the varying character of the formation traversed by the drill holes. - Claims allowed, 7.

8947. (4) Well-Logging Apparatus. R. L. Doan, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,404,622, issued July 23, 1946.

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In apparatus for electrically surveying a bore hole, the subcombination of a fluid-tight housing, having an inwardly tapered hole formed in its wall, an electrode band around the housing, covering the hole, an electrical connection from the electrode to the inside of the housing comprising a plug tapered to correspond to the taper of the hole and a spring between the electrode and the plug, and electrical insulating material between the electrode and the wall, and between the plug and the wall forming the walls of the hole, at least the insulating material between the plug and the wall forming a fluid-tight seal. - Claims allowed, 1.

8948. (4) Electrical Prospecting Apparatus. C. B. Bazzoni, Wallingford, Pa., and J. W. Millington, Beaumont, Tex., assignors to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U. S. Patent 2,408,029, issued September 24, 1946.

Means for determining the location and character of strata penetrated by a bore hole comprising a circuit including a coil, a condenser in parallel with the coil, and also in parallel therewith a circuit branch including a second coil and second condenser in series, one of said coils being an exploratory coil movable along said bore hole, and means for establishing through said circuit and exploratory coil in the strata adjacent the bore hole a high-frequency alternating current. - Claims allowed, 3.

8949. (4) Inrichting voor het langs electrishen weg onderzoeken van aardlagen en in het bezonder van petroleumhoudende en waterhoudende lagen, die door een boorput worden doorsneden. (Device for Electrically Studying Earth Formations, Especially Oil-Bearing and Water-Bearing Formations, Traversed by a Borehole.) Société de Prospection Electrique, Procédés Schlumberger, Paris. Dutch Patent 49,596, issued November 15, 1940.

The device consists of a circuit formed by a current source, and conductors connecting this source with two electrodes, at least one of which is located in the borehole near the level of the formations to be studied. The device also has another separate measuring circuit formed by a measuring instrument and conductors connecting this instrument with two electrodes, one of which likewise is located in the borehole near the level of the formations studied. The elctrodes of the two circuits located in the borehole are connected. - Claim allowed, 1.

8950. (5) Radiation Detector. D. G. C. Hare, Roslyn, N. Y., assignor to The Texas Co., New York 17, N. Y., a corporation of Delaware. U. S. Patent 2,397,661, issued April 2, 1946.

A radiation detecting device comprising a casing, a plurality of plates disposed in said casing in separated relation and connected together electrically to form a cathode member, each plate being provided with at least one hole, and the holes in the plates being disposed in alignment, an anode member

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comprising a wire extending through said aligned holes and insulated from said cathode plates, and a gaseous filling in said housing, said filling comprising a mixture of argon and petroleum ether. - Claims allowed, 6.

8951. (5) Radiation Detector. D. G. C. Hare, Roslyn, N. Y., assignor to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,398,934, issued April 23, 1946.

A device for detecting gamma radiation comprising a cylindrical cathode member, an anode member formed by a wire passing axially through said cylindrical member, and a plurality of separated plates extending laterally and externally of said cylindrical member. - Claims allowed, 6.

8952. (5) Radiographic Exposure Meter. Herbert Friedman, Arlington, Va. U. S. Patent 2,405,572, issued August 13, 1946.

A Geiger-Mueller tube for comparing hard radiation of unknown intensity with hard radiation of a known intensity, comprising a radiation-permeable tubular member forming a cathode, an anode extending axially therethrough, insulating disks closing the ends of said cathode, thereby defining an active tube volume, a radiation permeable envelope for said anode, cathode, and disks, and means for exposing the active volume defined by the cathode of said tube to a source of constant radiation impinging on said tube from a direction substantially coaxial with the tube axis. - Claims allowed, 4.

8953. (6) Temperature Sensitive Means. C. F. Kettering, Detroit, Mich., assignor to General Motors Corp., Detroit, Mich., a corporation of Delaware. U. S. Patent 2,399,640, issued May 7, 1946.

In detecting means, a plurality of target and thermocouple means arranged in quadrants on each side of both a horizontal and a vertical axis, two of the diagonal targets having a plurality of thermocouples attached thereto, conductive means connecting thermocouples in adjacent quadrants in series, and further conductive means crossconnecting the thermocouples on the other diagonal targets to give a potential difference across different terminals for a horizontal or a vertical temperature gradient or combination of the two. - Claims allowed, 3.

8954. (7) Method for Determining Combustible Gases in Gas Mixtures. Reinhold Weber, Kassel Kirchditmold, Germany; vested in the Alien Property Custodian. U. S. Patent 2,399,965, issued May 7, 1946.

The method of determining the quantity of hydrocarbons in gas mixtures by catalytic filament resistance comparison, which method consists in heating such a filament to a high temperature and passing the hydrocarbon laden gas mixture over said filament in a confined stream, whereby said hydrocarbons are burned, and simultaneously measuring the electrical resistance of said filament, and

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passing the gaseous products of combustion and residual unburned gases over said filament and again simultaneously measuring the filament resistance, whereby a comparison of the two measurements will indicate the quantity of the sought hydrocarbons. - Claims allowed, 3.

8955. (7) Mud Logging System. F. E. Hummel, Ojai, Calif., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,400,046, issued May 7, 1946.

An apparatus for continuously sampling a drilling fluid circulating in a well-drilling installation, comprising a closed separator, inclined conduit means in communication with the separator at the upper end, the lower end of the conduit means being adapted to be disposed in the open drilling fluid return discharge, a supply of diluting fluid, pipe means in communication between said supply and said conduit means for injecting a jet of said diluting fluid from said supply into said conduit means concurrently with the sample stream entering said conduit means, and pressure control means in said pipe means for maintaining the pressure of said diluting fluid jet at a constant value, whereby the delivery of the drilling fluid sample stream to the separator is effected at a constant rate. - Claims allowed, 3.

8956. (7) Method for Determining the Petroleum Hydrocarbon Content of Earth Samples. C. B. Brown, McAllen, Tex. U. S. Patent 2,403,631, issued July 9, 1946.

The method of exploring for subterranean petroleum deposits, which consists in preparing a solution containing a plurality of dissolved hydrocarbons of a measured quantity of an earth sample, subjecting a measured quantity of said solution to an ultraviolet radiation, passing the fluorescent light emanating from said solution through a plurality of spectral filters in succession, each of said filters corresponding respectively to one of a plurality of different bands of the spectrum, measuring the intensity of fluorescent light in each one of said spectral bands respectively, and comparing the measured intensity of the fluorescent light in each spectral band with each of a plurality of empirical charts in succession respectively, each of said charts corresponding to hydrocarbons of different known concentrations. - Claims allowed, 3.

8957. (7) Geochemical Prospecting Method. H. T. Kennedy, Oakmont, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,406,611, issued August 27, 1946.

A method of prospecting a region of the earth for subterranean gas and oil deposits which comprises taking samples of ground water in the earth at a plurality of spaced points in the region, at levels adjacent the water table, said ground-water samples being free from significant quantities of soil, confining the samples from access to air before substantial diminution of

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ethane concentration therein, and thereafter quantitatively determining traces of ethane dissolved in the samples as indicative of the presence of oil or gas. - Claims allowed, 2.

8958. (8) Apparatus for Well Logging. W. L. Russell, Tulsa, Okla. U. S. Patent 2,398,562, issued April 16, 1946.

In a surveying device for recording characteristics of the formations traversed by a bore hole, a caliper tool adapted to being lowered into said bore hole, said tool having pairs of contiguous arms mounted for independent movement in radial planes extending through the axis of said bore hole, said arms having blunt and sharp contact portions, respectively, and adapted to contact contiguous areas of the wall of the bore hole to engage the surface of said formations, and mechanism connected with said arms for recording the relative movements thereof. - Claims allowed, 9.

8959. (9) Tridimensional Radio Navigational System. E. G. Gage, Brooklyn, N. Y., assignor of two-thirds to Leon Ottinger, New York, N. Y. U. S. Patent 2,399,671, issued May 7, 1946.

A radio navigational system comprising a single transmitter of electromagnetic waves, including a pulse generator having a straight-line modulation characterisitc, a plurality of direction-finding means for the electromagnetic waves remotely located with respect to the transmitter thereof and positioned respectively in predetermined relationship to an observation point, each of said direction-finding means being tuned to the said transmitter, and including two directional receiving elements located at a predetermined angle to each other and means to tune both receiving elements to the radiated frequency, together with two translation means operatively associated with the respective receiving elements and tuning means, the whole affording two substantially identical receiver channels, cathode-ray tube means operatively coupled to said receiver channels and having a viewing screen including an indicating scale, whereby the received energy produces a plurality of divergent linear traces adapted for cooperation with said scale. - Claims allowed, 48.

8960. (9) Time Cycle Telemetering. Daniel Silverman, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,400,170, issued May 14, 1946.

An electrical telemetering system for transmitting signals through a transmitting medium, the duration of said signals indicating desired information, comprising means for supplying electric current to points in said medium for transmission therethrough, means for intermittently and recurrently varying at least one known characteristic of said electric current to form at least two signals having different characteristics, means responsive to an electrical resistance which varies as a function of the information desired for controlling the duration of at least one of said signals, the duration of

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at least one other of said signals being uninfluenced by the desired information, and means for receiving said signals and for producing an indication of the duration of said signals. - Claims allowed, 14.

8961. (9) Well Sounding Microphone. J. T. Kremer, Houston, Tex., assignor to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,403,535, issued July 9, 1946.

A microphone adapted to respond to pressure waves passing through a gaseous medium in a conduit under relatively high pressure, comprising a tubular housing closed at one end and connected at its open end to said conduit, a body member, a pair of disks at opposite sides of said body member, a diaphragm secured at the outer face of one of said disks to provide an air-tight chamber between the diaphragm and disk, a compressible member mounted at the rear of the other disk, a duct connecting the interior of said compressible member with said chamber, said body member and disks being mounted in said housing so that the peripheries of the disks fit snugly against the inner surface of said housing with the diaphragm facing said conduit and the peripheries of said disks being provided with apertures to permit said gaseous medium to surround and compress said compressible member to force air therefrom through said duct to said chamber so as to equalize pressure on opposite sides of said diaphragm. - Claims allowed, 2.

8962. (9) Distance and Direction-Determination System. Irving Wolff, Merchantville, N. J., assignor to Radio Corporation of America, a corporation of Delaware. U. S. Patent 2,407,198, issued September 3, 1946.

An object detector including, in combination, means for radiating pulses of radio frequency energy, a superheterodyne device, including a local oscillator for receiving said energy after reflection from the object to be detected, means for making the local oscillator of said receiving device oscillate at continuously varying intervals after the radiation of each of said pulsos, a second means synchronously varying at said continuously varying rate, and means including said device for indicating the respone to said reflected energy. - Claims allowed, 21.

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INDEX

(The figure in parentheses refers to the class in which the entry stands; see list in table of contents)

	Class	Abs.
AGG Survey of Northern Australia	(4)	8865
Aiken, C. B.	(10)	8944
Aslakson, C. I.	(9)	8916
Bains, T. M., Jr.	(4)	8866
Baker, J. S.	(4)	8867
Baldini, Ugo	(9)	8917
Ballarin, Silvio	(1)	8807
Barbour, W. E., Jr.	(5)	8877
Bates, R. L.	(8)	8895
Bays, C. A.	(4)	8868
Bazzoni, C. B.	(10)	8948
Beck, R. S.	(9)	8918
Beilharz, C. F.	(8)	8899
Berson, I. S.	(3)	8838
Bonine, C. A.	(8)	8896
Borden, J. L.	(8)	8897
Bossolasco, Mario	(2)	8828
Branson, N. G.	(3)	8839
Brown, B. W.	(5)	8879
Brown, C. B.	(10)	8956
Bulanzhe, Iu. D.	(1)	8808
Caloi, P.	(3)	8840
Campbell, J. L. P.	(5)	8878
Canadian Legion	(9)	8919
Canadian Mining Journal	(2)	8823
Centre National de la Recherche Scientifique, France	(8)	8898
Chemical Engineering & Mining Review	(4)	8869
Cody, C.	(3)	8841
Cody, M.	(3)	8841
Coulomb, Jean	(3)	8842
Curtiss, L. F.	(5)	8879
Davis, D. M.	(8)	8899
Dawson, Herbert	(8)	8900
Day, A. H.	(8)	8901
DeMent, Jack	(5)	8880
———————	(7)	8891
Department of Scientific & Industrial Research, N. Z.	(2,3)	8824
Doan, R. L.	(10)	8947
Donohoo, H. V. W.	(1,2)	8809
Dresbach, C. H.	(8)	8902
Dutilly, Artheme	(9)	8920

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	Class	Abs.
Eby, J. B.	(8)	8903
Elsasser, W. M.	(2)	8825
Fang, J. F.	(1)	8810
Fisher Research Laboratory	(4)	8870
Fleming, J. A.	(2)	8826
Frenkel, Ia. I.	(2)	8827
Friedman, H.	(5)	8886
_____	(10)	8952
Frowe, Eugene	(1)	8811
Furnival, G. M.	(4)	8871
Gabriel, V. G.	(7)	8892
_____	(8)	8904
Gage, E. G.	(10)	8959
Gamburtsev, G. A.	(3)	8843, 8844
Giulietti, Giulio	(2)	8828
Gogoladze, V.	(3)	8845, 8846
Gorman, L. J.	(4)	8872
Gross, H. E.	(9)	8921
Gutenberg, Beno	(3)	8847
Guyod, Hubert	(6)	8889
Guzman, J. A.	(1,3)	8812
Hanners, A. J.	(2)	8833
Harang, Leiv	(2)	8829
Hare, D. G. C.	(10)	8950, 8951
Harris, Sidon	(3)	8848
Hartmann, P. C. P.	(2)	8830
Hée, A.	(5)	8881
Heroy, W. B.	(8)	8905
Howe, H. H.	(2)	8831
Huelin, G. S.	(1)	8813
Hummel, F. E.	(10)	8955
Hurwitz, Louis	(2)	8831
Illing, V. C.	(9)	8922
Jenkins, D. S.	(9)	8923
Jensen, Homer	(2)	8832
Jung, Karl	(8)	8906
Kazinsky, V. A.	(1)	8814
Keller, Fred	(2)	8833
Kennedy, H. T.	(10)	8957

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	Class	Abs.
Kettering, C. F.	(10)	8953
Kilkenny, J. E.	(5)	8882
Kirnos, D. P.	(3)	8849
Klepp, E. C.	(10)	8945
Koning, L. P. G.	(3)	8850
Kremer, J. T.	(10)	8961
Krug, J. A.	(9)	8924
Lee, F. W.	(4)	8873
Leet, L. D.	(3)	8851
Lovely, H. R.	(9)	8925
Lyon, Duane	(9)	8926
Macelwane, J. B.	(3)	8852
Masarskii, S. I.	(3)	8853
McHenry, Richard	(10)	8941
McKellar, I. C.	(5)	8883
McLellan, A. G.	(5)	8884
Mercier, V. J.	(5)	8885
Merino y Coronado, J.	(3)	8854
Military Service Publishing Co.	(9)	8927
Miller, J. F. G.	(10)	8941
Millington, J. W.	(10)	8948
Miner, K. H.	(4)	8867
Mining Journal, London.	(7)	8893
——————.	(8)	8907
Mining Record, Denver, Colo.	(4)	8874
Muehlhouse, C. O.	(5)	8886
Neufeld, Jacob	(10)	8946
Nichols, E. A.	(6)	8890
Oil, New Orleans, La.	(1)	8815
Oks, Meyer	(3)	8855
Oppenheim, Victor	(9)	8928
Osterhoudt, W. J.	(3)	8856
Pendse, C. G.	(3)	8857
Perri, Emilio	(3)	8858
Petroleum Times, London.	(1)	8816
——————.	(8)	8908
Petroleum World	(2)	8834
Pettersson, Hans	(5)	8887
Petty, O. S.	(10)	8943
Peyton, Garland	(9)	8929
Pratt, W. E.	(9)	8930
Rada, F. D., de	(5)	8888
Rankine, A. O.	(1,3)	8817

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	Class	Abs.
RCA Manufacturing Co.	(9)	8931
Reed, J. C.	(9)	8932
Reed, Paul	(3)	8859
Reichert, Conrad	(10)	8942
Rice, D. A.	(9)	8916
Richter, C. F.	(3)	8847
Rittenhouse, Gordon	(9)	8933
Riznichenko, Iu. V.	(3)	8860
Roman, Irwin	(1,2)	8818
Romanoff, Melvin	(4)	8875
Rothé, Edmond	(3)	8861
Russell, W. L.	(10)	8958
Samuell, J. H.	(5)	8878
Sandberg, C. H.	(4)	8873
Savarenskii, E. F.	(3)	8862
Saxov, S. E.	(1)	8819
Scharon, H. L.	(4)	8873
Scheffer, Vittorio	(1)	8820
Schlumberger, R. A.	(8)	8909
Science Museum, London	(8)	8910
Scientific American	(9)	8934
Scott, W. E.	(2)	8835
Silverman, Daniel	(10)	8960
Skillings' Mining Review	(2)	8836
Société de Prospection Electrique, Paris	(10)	8949
Standard of California	(8)	8911
Standard Oil Development Co., N. J.	(10)	8939
Targhetta, J. B.	(8)	8912
Tovell, W. M.	(4)	8871
Uren, L. C.	(8)	8913
Van Tuyl, F. M.	(7)	8894
Varnes, D. J.	(9)	8935
Vening Meinesz, F. A.	(3)	8863
Ver Wiebe, W. A.	(8)	8914
Volet, C.	(1)	8821
Walstrom, J. E.	(10)	8940
Weaver, Paul	(8)	8902
Weber, Reinhold	(10)	8954
Weinstein, D. H.	(3)	8864
Westman, B. J.	(4)	8876
Wiener, P. F.	(9)	8936
Wolff, Irving	(10)	8962
World Petroleum	(2)	8837

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	Class	Abs.
Yacimientos Petroliferos Fiscales (Argentina).....	(8)	8915
Zeuner, F. E.	(5,9)	8937
ZoBell, C. E.	(9)	8938
Zwerger, Rudolf, von.....	(1,2)	8822

Generated on 2024-09-19 17:53 GMT / https://hdl.handle.net/2027/osu.32435030643837
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Original from
THE OHIO STATE UNIVERSITY

INDEX TO GEOPHYSICAL ABSTRACTS 124 - 127

January - December 1946

	Abs.	Class	No.
A			
Adler, J. L. Notes on formation of seismic velocity.....	124	(3)	8359
Aerial, Geological and Geophysical Survey of Northern Australia. Geophysical survey of Redbank copper field, Northern Territory.....	126	(2,4)	8705
_____ Geophysical survey of Croydon goldfield, Queensland.....	126	(4)	8706
_____ Geophysical survey of Lolworth goldfield, Queensland.....	127	(4)	8865
Afanasieva, V. I. Spherical harmonic analysis of the earth's magnetic field for epoch 1945.....	125	(2)	8495
Agnew, R. D. Well surveying instrument, U. S. Patent 2,378,526.....	124	(10)	8475
Aiken, C. B. Electrical method and apparatus for logging boreholes, U. S. Patent 2,388,896.....	124	(10)	8463
_____ Electrical logging, U. S. Patent 2,390,409.....	125	(10)	8629
_____ Method and apparatus for simultaneous determination of various properties of the subsoil, U. S. Patent 2,398,761.....	127	(10)	8944
Albin, Adriano. A pneumometric gravimeter.....	126	(1)	8644
American Geophysical Union. Education in geophysics.....	125	(8)	8574
_____ Canadian Committee on geophysics.....	125	(8)	8575
_____ Supplementary information relating to education in geophysics.....	126	(8)	8736
Anderson, D. M. Electrical logging - an aid to wartime production.....	126	(4)	8707
Anderson, J. F. Trends in geophysical exploration.....	125	(8)	8576
Andreev, N. N. Radiation of a sound in water, as affected by depth of submersion (with Brekhovskikh, L. M.).....	126	(9)	8757
Andronov, I. Oil in the Devonian strata.....	125	(9)	8598
Apsen, Boris. The Eötvös torsion balance. Its theory and application in higher geodesy (in Croatian).....	124	(1)	8327
Archie, G. E. Method and apparatus for electrically logging wells, U. S. Patent 2,400,678.....	126	(10)	8790
Arlick, A. B. Electrical potential of the earth's surface.....	126	(4)	8708
Arndt, J. P., Jr. Transient signal recording-reproducing device, U. S. Patent 2,378,383.....	124	(10)	8480
Aslakson, C. I. Use of shoran in geodetic control (with Rice, D. A.).....	127	(9)	8916

Generated on 2024-09-19 17:50 GMT / https://hdl.handle.net/2027/osu.32435030643837
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	Abs.	Class	No.
B			
Bains, T. J., Jr. Will radar aid our ghost camps?	127	(4)	8866
Baker, G. J. Dimensions and units of electromagnetic quantities	125	(2)	8496
Baker, J. S. Some aspects of the mathematical interpretation of electric logs (with Miner, K. H.)	127	(4)	8867
Baker, M. B. Gold and iron prospects in Canada	126	(9)	8758
Baldini, Ugo. On the subject of alignment (in Italian)	127	(9)	8917
Ballarin, Silvio. Analysis of certain methods for calculating the topographic reduction of Eötvös profiles (in Italian)	127	(1)	8807
Balling, Eva. A new determination of Eve's constant (with Hess, V. F.)	124	(5)	8556
Balsley, J. R. Magnetic exploration for iron ore in northern New York (with Hawkes, H. E.)	125	(2)	8502
_____ The airborne magnetometer	126	(2)	8659
Baranov, V. L. The use of radiochemical analysis for the correlation of geological strata (with Kunasheva, K. G., and Tseitlin, S. G., in Russian)	124	(5)	8395
Barb, C. F. Selected well logs of Colorado	124	(9)	8425
Barbour, W. E., Jr. A statistically accurate scaling method for radioactivity measurements	127	(5)	8877
Barcklow, J. C. Better interpretation of neutron curves.	125	(5)	8554
Barnett, S. J. Two electric generators suitable for the measurement of magnetic intensities and their variations, and for other purposes	126	(2)	8660
Barnitzke, J. E. Determination of ground thickness by gravimetric measurements (in German)	124	(1)	8328
Barsch, Otto. Problems of applied geophysics in wider Germany and eastern Europe (in German)	126	(1,8)	8737
Barta, G. The temperature correction for the LaCour magnetic balance (in Hungarian)	124	(2)	8338
Barth, Gustav. Means for measuring magnetic fields, U. S. Patent 2,390,051	125	(10)	8620
Barthelmes, A. J. Application of continuous profiling for refraction shooting	124	(3)	8360
Bataafsche Petroleum Maatschappij. Method and device for studying the contents of a borehole, Dutch Patent 49,197	126	(10)	8791
Bates, R. L. Developments in Arizona, western New Mexico, and northern New Mexico in 1945	127	(8)	8895
Bays, C. A. The use of electrical earth resistivity surveys in Illinois (with Workman, L. E., and Buhle, M. B.)	125	(4)	8553
_____ Petroleum possibilities of Maquoketa and "Trenton" in Illinois	125	(9)	8599
_____ Use of electrical geophysical methods in ground-water supply	127	(4)	8868

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	Abs.	Class	No.
Bays, G. S. Well logging, U. S. Patent 2,392,357	126	(10)	8787
Bazzoni, C. B. Electrical prospecting apparatus, U. S. Patent 2,408,029 (with Millington, J. W.)	127	(10)	8948
Beach, L. F. Magnetic field responsive device, U. S. Patent 2,383,460 (with Purvis, J. C.)	124	(10)	8445
_____ Magnetic field responsive device, U. S. Patent 2,374,166 (with Purvis, J. C.)	125	(10)	8618
Beck, R. S. Highlights of Washington and Oregon biostratigraphy	127	(9)	8918
Beers, R. F. Radiometric determination of potassium in rocks and soils	124	(5)	8396
Begun, S. J. Recording and reproducing device, U. S. Patent 2,378,388	124	(10)	8481
_____ Recording-reproducing device, U. S. Patent 2,378,389	124	(10)	8482
Beilharz, C. F. Developments in the upper Gulf Coast of Texas in 1945 (with Davis, D. M.)	127	(8)	8899
Belote, E. S. Adjustment of traverses	126	(8)	8738
Bergman, Ludwig. Ultrasonics and their scientific and technical application (in German)	126	(9)	8759
Bernard, Pierre. A study of microseismic disturbance and its variations (in French)	125	(3)	8518
Berson, I. S. Spatial problem of the interpretation of hodographs of refracted waves - One level surface of separation (in Russian)	126	(3)	8675
_____ Hodographs of reflected waves and their interpretation by means of the horizontal gradient of velocity (in Russian)	126	(3)	8676
_____ Interpretation of transverse hodographs of refracted waves - One level surface of separation (in Russian)	127	(3)	8338
Beyer, G. L., Jr. A recording six-trace cathode-ray oscillograph (with Shepard, W., Jr.)	126	(3)	8677
Blau, L. W. Geophysics, geochemistry, and the practical man of petroleum (in Spanish)	124	(8)	8413
_____ Thermal prospecting, U. S. Patent 2,403,704	126	(10)	8800
Bodle, R. R. United States earthquake, 1943	125	(3)	8519
Boliden's Gravaktienbolag. Apparatus for measuring the acceleration of the force of gravity, Dutch Patent 49,422	126	(10)	8780
Bonine, C. A. Exploration for petroleum and natural gas.	127	(8)	8896
Boots, P. H. Geophysical operations in Kuwait (with McKee, A. H.)	125	(8)	8577
Borden, J. L. Developments in Oklahoma in 1945	127	(8)	8897
Born, W. T. The attenuation constant of earth materials, II	124	(3)	8361
Bossolasco, Mario. Application of the new compass to the determination of the angular elements of the geomagnetic field (with Giulietti, G., in Italian)	127	(2)	8828

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	Abs.	Class	No.
Boyd, L. H. Army vehicles for geophysical crews.....	124	(8)	8414
_____ Gravity meter survey of the Kettleman-Hills Lost-Hills trend, California.....	126	(1)	8645
Branson, N. G. Strain-gauge amplifier.....	127	(3)	8839
Brekhovskikh, L. M. Radiation of a sound in water, as affected by depth of submersion (with Andreev, N.N.)	126	(9)	8757
_____ Sound radiation from a source placed in water at small depth.....	126	(9)	8760
Brewer, A. K. The mass spectrometer as an analytic tool.	125	(7)	8568
Brinton, H. G. Amplifier circuits, U. S. Patent 2,390,773.....	124	(10)	8453
Britton, J. W. An improved arrangement of the Single Current Line Electrode Method of geophysical investigation (with Gilchrist, L.).....	126	(4)	8713
Broadhurst, E. Geophysical prospecting at Moonta and Kadina.....	126	(2,4)	8709
Brod, I. C. Geological terminology in classification of oil and gas reservoirs.....	124	(9)	8426
Broding, R. A. Method and apparatus for recording seismic waves, U. S. Patent 2,392,758 (with Minton, J. P.).....	126	(10)	8784
Bronston, Allen. Newer phases in geochemcial technique..	126	(7)	8733
Brotherhood, G. R. Report on exploration for oil in British Guiana (with Kugler, Mackenzie, Stainforth, and Griffiths).....	124	(3)	8376
Brown, B. W. An arrangement with small solid angle for measurement of beta rays (with Curtiss, L. F.).....	127	(5)	8879
Brown, C. B. Method for determining the petroleum hydrocarbon content of earth samples, U. S. Patent 2,403,631.....	127	(10)	8956
Brown, S. C. Design of beta-ray and gamma-ray Geiger Müller counters (with Good, W., and Kip, A.).....	126	(5)	8723
Bucky, P. B. Rock bursts - A symposium.....	125	(3)	8520
Buhle, M. B. The use of electrical earth resistivity surveys in Illinois (with Workman, L. E., and Bays, C. A.).....	125	(4)	8553
Bulanzhe, Iu. D. On the calculation of the effects of variation in chronometer motion on pendulum observations (in Russian).....	126	(1)	8646
_____ Certain questions of method in gravity surveying (in Russian).....	127	(1)	8808
Bullard, E. C. Geological time.....	124	(5)	8397
_____ Thermal history of the earth.....	124	(6)	8403
Bullen, K. E. Features of the travel-time curves of seismic rays.....	125	(3)	8521

C

Cagniard, L. Some results of a theoretical study of the reflection and refraction of progressive seismic waves (In French).....	124	(3)	8362

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	Abs.	Class	No.
Caloi, P. Determination of the coordinates of the hypocenter of a proximate earthquake by means of arrival times or direct longitudinal and transverse waves (in Italian)	127	(3)	8840
Campbell, J. B. Additional data on the spontaneous increase of magnetic moment (with Nelson, J. H.)	125	(2)	8511
Campbell, J. L. P. A review of general notes on radioactivity well-log interpretation (with Winter, A.B.)	126	(5)	8721
_____ Pre-Permian radioactivity surveys in west Texas and New Mexico (with Samuell, J. H.)	127	(5)	8878
_____ Some practical aspects of radioactivity well logging (with Jackson, W. J.)	124	(5)	8399
Campbell, O. E. The fluorographic method of petroleum exploration	126	(7)	8734
Canadian Legion. Prospecting in Canada	127	(9)	8919
Canadian Mining and Metallurgical Bulletin, Petroleum and natural gas	124	(3)	8363
Canadian Mining Journal. The new airborne magnetometer	127	(2)	8823
Carder, D. S. Seismic investigations in the Boulder Dam area, 1940-1944	125	(3)	8522
Carreño, A. Gravimetry in Mexico (with Medina, M., and Toscano, R., in Spanish)	125	(1)	8408
Carson, Howard. Vibration pickup, U. S. Patent 2,387,223	124	(10)	8451
Carter, E. The texture of Mississippian, Upper Devanian, and Lower Pennsylvanian sandstones in the Appalachian basin (with Rittenhouse, G.)	125	(9)	8611
Cattala, L. Magnetic prospecting of the iron deposit of the Puymorens mine (with Rothé, J. P., in French)	124	(2)	8339
Centre National de la Recherche Scientifique. Bulletin analitique, 1939+ (in French)	127	(8)	8898
Chang, H. C. An investigation of the Chaotung lignite field by the Wenner's resistivity method of electrical prospecting (with Ku, K. H., and Wang, T. C.)	124	(4)	8392
Chemical Engineering and Mining Review. Limitations of geophysical prospecting	127	(4)	8869
Choate, B. M. Seismic surveys of Neale Field, Beauregard Parish, Louisiana (with Clifford, C. C., Jr.)	125	(3)	8523
Christie, N. J. Seismograph exploration in England, 1944 and 1945	125	(3)	8524
Chun, M. E. Electrical well logging method and apparatus, U. S. Patent 2,393,009	124	(10)	8465
Clark, H. L. Short time interval meter, U. S. Patent 2,377,757	124	(10)	8479
Clifford, O. C., Jr. Seismic surveys of Neale Field, Beauregard Parish, Louisiana (with Choate, B. M.)	125	(3)	8523
Coates, G. E. The principles of electrolytic corrosion of metals	126	(4)	8710
Cody, C. C. Seismograph exploration in Venezuela (with Cody, M.)	127	(3)	8841

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	Abs.	Class	No.
Cody, M. C. Richmond Exploration has active campaign started in Venezuela	124	(3)	8364
____ Seismograph exploration in Venezuela (with Cody, C. C.)	127	(3)	8841
Coffin, R. C. Recent trends in geological-geophysical exploration and methods of improving the use of geophysical data	125	(8)	8578
Condon, E. U. New units for the measurement of radioactivity (with Curtis, L. F.)	126	(5)	8722
Cooke, N. M. Electronics dictionary, 1st ed., 1945, (with Markus, John)	124	(9)	8427
Cooley, E. H. Well survey apparatus, U. S. Patent 2,396,420 (with Hayward, J. T.)	124	(10)	8466
Cornelius, J. R. Method of and means for making fine measurements, U. S. Patent 2,387,496	125	(10)	8642
Cornfield, Guy. The behavior of zinc-iron couples in carbonate soil (with Gilbert, T. H.)	126	(4)	8712
Cortes, H. C. Publication of geophysical case histories.	126	(8)	8739
Coster, H. P. The gravity field of the western and central Mediterranean	124	(1)	8329
Coulomb, Jean. Can deep-seated seismic activity and large negative anomalies of gravity be attributed to a plastic expansion of the earth (in French)	126	(1,3)	8647
_____ On the velocity of propagation of a rupture in a fault (in French)	127	(3)	8842
Cowles, L. G. The narrow-band resistance coupled amplifier	124	(3)	8365
Cox, B. B. Transformation of organic material into petroleum under geological conditions	126	(9)	8761
Crawford, F. W. Method of prospecting for hydrocarbons, U. S. Patent 2;398;580	125	(10)	8639
Crawford, W. L. Spray deflector for shot holes, U. S. Patent 2,387,770 (with Rogers, S. D., and Rudolph, P. J.)	125	(10)	8622
Crowell, E. V. Means for testing formations in wells, U. S. Patent 2;397,473	125	(10)	8641
Cullen, T. L. On the exhalation of radon from the earth.	125	(5)	8555
Curry, R. S., Jr. Flux valve, U. S. Patent 2;389,146 (with Fragola, C. F., and Depp, M. C.)	125	(10)	8619
_____ Gyro flux valve compass system, U. S. Patent 2,393,974	126	(10)	8781
Curtiss, L. F. New units for the measurement of radioactivity (with Condon, E. U.)	126	(5)	8722
_____ An arrangement with small solid angle for measurement of beta-rays (with Brown, B. W.)	127	(5)	8879

D

Darnell, E. F. Loading basket for explosive charges, U. S. Patent 2,377,763	124	(10)	8447

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	Abs.	Class	No.
Davis, D. M. Developments in the upper Gulf Coast of Texas in 1945 (with Beilharz, C. F.)	127	(8)	8899
Dawson, Herbert. The planning of a foreign geophysical operation	127	(8)	8900
Day, A. H. Continuing search for oil in Britain	127	(8)	8901
Deegan, C. J. Large exploration campaign under way in Canada	125	(8)	8579
_____ Exploring the continental shelf	126	(1)	8648
Deel, S. A. Alaska magnetic tables and magnetic charts for 1940	124	(2)	8340
DeGolyer, E. L. Bibliography on the petroleum industry (with Vance, H.)	125	(9)	8600
DeLury, J. S. Outline of a hypothesis to explain crustal movement	124	(1,6)	8330
_____ Compression creep of rubber and rock	126	(9)	8763
_____ Correlation of schistosity and tectonic theory	126	(9)	8762
DeMent, Jack. Fluorochemistry	124	(7)	8407
_____ Fluorochemistry in petroleum science	125	(7)	8569
_____ Locating uranium with the ultraviolet lamp	127	(5)	8880
_____ Black light and bacteria - new tools for petroleum prospecting	127	(7)	8891
Department of Mines and Resources, Canada. Geological map of the Dominion of Canada	125	(9)	8601
Department of Scientific and Industrial Research, New Zealand. 38th Annual Report 1943-44: Geological Survey	127	(2,3)	8824
Department of the Interior, U. S. A. Annual report of the Secretary for fiscal year ended June 30, 1945	124	(8)	8423
Depp, M. C. - Flux valve, U. S. Patent 2,389,146 (with Curry, R. S., and Fragola, C. F.)	125	(10)	8619
Digiesi, Domenico. Magnetic map of Libia recently compiled by the Military Geographical Institute (in Italian)	126	(2)	8661
Dix, C. H. The interpretation of well-shot data: Simplest cases of lateral velocity variation	124	(3)	8366
Doan, R. L. Well Logging apparatus, U. S. Patent 2,404,622	127	(10)	8947
Doll, H. G. Method for determining the oil content of subterranean formations, U. S. Patent 2,395,617	126	(10)	8783
Donohoo, H. V. W. Blimps and mineral reconnaissance surveys	127	(1,2)	8809
Dove, Thomas, Jr. Lowering device for large cartridges, U. S. Patent 2,387,701	125	(10)	8621
Dresbach, C. H. A review of geophysical methods, devices and procedures (with Weaver, Paul)	127	(8)	8902
Dufay, Jean. Relation between solar activity and disturbance of magnetic declination registered at Saint Genis-Laval (with Flajolet, P., in French)	126	(2)	8662
Dutilly, Artheme. Bibliography of bibliographies on the Arctic	127	(9)	8920

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	Abs.	Class	No.
Dzens-Litovsky, A. I. Natural gases of bottom deposits of mineral lakes	125	(7)	8570
E			
Eastman Kodak Company. Kodak materials for aerial photography	124	(9)	8428
Eblé, Louis. Diurnal variation of magnetic disturbance (in French)	125	(2)	8497
Eby, J. B. The status of geophysics	127	(8)	8903
Eckhardt, E. A. The airborne magnetometer (abs.)	125	(2)	8498
_____ The airborne magnetometer	126	(2)	8663
Eisler, J. D. Recording system in seismic surveying, U. S. Patent 2,394,990 (with Sharpe, J. A.)	124	(10)	8454
Elsasser, W. M. Induction effects in terrestrial magnetism: Secular variation	127	(2)	8825
Ennis, G. H. Method of and apparatus for electrically determining the formation in wells, U. S. Patent 2,397,255	125	(10)	8630
_____ Method and apparatus for electrically coring in cased boreholes, U. S. Patent 2,397,254	126	(10)	8789
Enslin, J. F. A comparison of the gravimeter and torsion balance methods of geophysical prospecting	126	(1)	8649
_____ Basins of decomposition in igneous rocks: Their importance as underground water reservoirs and their location by the electrical resistivity method.	126	(4)	8711
Evans, P. Geophysical prospecting for oil in India (with Rankine, A. O.)	125	(1)	8490
Evjen, H. M. The principle of variation in path with an application to structural mapping	124	(4)	8389
Evrard, Pierre. Magnetic survey of the manganese-bearing superior Salmien in the valley of the Lienne (with Koenigsfeld, L., in French)	124	(2)	8341
_____ The curves of horizontal and vertical magnetic anomalies caused by a thin inclined layer (in French)	125	(2)	8499
Ewing, Maurice. Training for research in geophysical borderlands of geology	126	(8)	8740
_____ Recent geophysical investigations in the Atlantic ocean basin (with Woollard, G. P.)	126	(8)	8741
F			
Fairbridge, R. W. Submarine slumping and location of oil bodies	124	(9)	8429
Fang, J. F. Gravity anomalies and the deflection of the plumb line	127	(1)	8810
Fearon, R. E. How the properties of nuclear radiation influence radioactivity logs	124	(5)	8398

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	Abs.	Class	No.
_____ Well logging method, U. S. Patent 2,390,931.....	124	(10)	8470
_____ Well survey method and apparatus, U. S. Patent 2,390,433.....	125	(10)	8634
Fedynsky, V. V. Geophysical prospecting for oil in the U.S.S.R. at the time of the patriotic war, 1941-43 (in Russian).....	124	(8)	8415
Field, R. M. F. A. Vening Meinesz - A geodesist's contribution to geoscience.....	124	(1)	8331
Fillippone, W. R. Depth-displacement slide rule.....	124	(3)	8367
Finch, R. H. On the depth of foci of earthquakes on the island of Hawaii.....	125	(3)	8525
Fisher, G. R. Geophysical prospecting for the layman....	125	(4,8)	8548
Fisher Research Laboratory, Palo Alto, California. The M-Scope, a tool for the mining industry.....	127	(4)	8870
Flajolet, Philippe. Relation between solar activity and disturbances of magnetic declination registered at Saint Genis - Laval (with Dufay, J., in French).....	126	(2)	8662
Fleming, J. A. Summary of the year's work to June 30, 1945, Department of Terrestrial Magnetism, Carnegie Institution of Washington.....	124	(2)	8342
_____ Geomagnetic secular variations and surveys.....	127	(2)	8826
Flugge-DeSmith, R. A. H. The measurement of the geothermic gradient by means of the clinical thermometer.....	126	(6)	8730
Forbush, S. E. Gravity determinations on the Carnegie, 1928-29.....	125	(1)	8485
Forrester, J. F. Principles of field and mining geology.	126	(9)	8764
Fragola, C. F. Flux valve, U. S. Patent 2,389,146 (with Depp, M. C., and Curry, R. S.).....	125	(10)	8619
Frank, A. J. The earthquake of March 27, 1945 on the Moselle (Missouri) Fault.....	125	(3)	8526
Frenkel, Ia. I. On the origin of terrestrial magnetism..	127	(2)	8827
Friedman, Herbert. Geiger-Müller counter technique for high counting rates (with Muehlhause, C. O.).....	127	(5)	8886
_____ Radiographic exposure meter, U. S. Patent 2,405,572.....	127	(10)	8952
Frowe, Eugene. A diving bell for underwater gravimeter operations.....	127	(1)	8811
Fu, C. Y. Studies on seismic waves, I.....	124	(3)	8368
_____ Studies on seismic waves, II.....	124	(3)	8369
Furnival, G. M. Structure drilling in oil exploration, southern Alberta (with Tovell, W. M.).....	127	(4)	8871

G

Gabriel, V. G. Present status of geochemical prospecting.....	125	(7)	8571
_____ Electronics in the petroleum industry.....	126	(8)	8742
_____ Geochemical prospecting.....	127	(7)	8892

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	Abs.	Class	No.
_____ Geophysical prospecting methods.....	127	(8)	8904
Gage, E. G. Tridimentional radio navigational system U. S. Patent 2,399,671.....	127	(10)	8959
Gallet, E. S. Petroleum studies and surveys in the Magallanes and the Isla Grande de Tierra del Fuego (in Spanish).....	125	(8)	8580
Gamburtsev, G. A. On the significance and interpretation of transverse profiles in exploration by seismic reflection (in Russian).....	126	(3)	8678
_____ Methods of interpreting isotime maps of refracted waves (in Russian).....	126	(3)	8679
_____ Field work on perfecting seismic methods for exploration in the eastern Apsheron peninsula (in Russian).....	127	(3)	8843
_____ Concerning the question of the origin of seismic reverberation at sea (in Russian).....	127	(3)	8844
Gane, P. G. A seismic investigation of the Witwatersrand earth tremors (with Hales, A. L., and Oliver, H. A.)	126	(3)	8680
Gardner, L. W. Vertical velocities from reflection shooting.....	125	(3)	8527
Gassmann, Fritz. Magnetic analysis of iron ores (with Niggli, E., in German).....	125	(2)	8500
Gayer, R. B. Mechanical aids to prospecting.....	126	(8)	8743
Gebhardt, R. E. An induction magnetometer: Construction and tests.....	125	(2)	8501
Gelfand, I. S. Direct and inverse problem of the magnetic potential for a spherical segment (in Russian)..	124	(2)	8343
Geophysics, Menasha, Wisconsin. The job of the geophysicist.....	125	(8)	8581
Gerling, E. K. An absolute time scale for the history of the earth (with Polkanov, A. A., in Russian).....	126	(5)	8728
Geyer, R. L. Combined surface and seismic exploration party.....	124	(3)	8370
Gilbert, T. H. The behavior of zinc-iron couples in carbonate soil (with Cornfield, Guy).....	126	(4)	8712
Gilchrist, Lachlan. An improved arrangement of the Single Current Line Electrode Method of geophysical investigation (with Britton, J. W.).....	126	(4)	8713
Gilmore, M. H. Microseisms and ocean storms.....	126	(3)	8681
_____ Microseisms classified according to type of storm..	126	(3)	8682
Giulietti, Giulio. Application of the new compass to the determination of the angular elements of the geomagnetic field (with Bossolasco, M., in Italian)....	127	(2)	8828
Glen, J. A. New role of the Canadian prospector.....	126	(9)	8765
Gogoladze, V. G. On Rayligh boundary waves.....	127	(3)	8845
_____ General formulae for the reflection and refraction of non-stationary elastic waves.....	127	(3)	8846
Goldstine, A. The electronic numerical integrator and computer ENIAC (with Goldstine, H.).....	126	(9)	8766

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	Abs.	Class	No.
Goldstine, H. The electronic numerical integrator and computer ENIAC (with Goldstine, A.)	126	(9)	8766
Good, W. Design of beta-ray and gamma-ray Geiger-Müller counters (with Kip, A., and Brown, S.)	126	(5)	8723
Gorman, L. J. Electrolysis surveys on underground cables	127	(4)	8872
Gorshkov, G. V. Some data on the physical foundations of radioactive geophysical methods of exploration (with Grammakov, A., Starik, I., and Shpak, in Russian)	126	(5)	8724
Grammakov, A. G. Some data on the physical foundations of radioactive geophysical methods of explorations (with Gorshkov, G., Starik, I., and Shpak, V., in Russian)	126	(5)	8724
Green, C. K. Seismic sea waves of April 1, 1946, as recorded on tide gages	126	(3)	8683
Gregersen, Albert. Significant California petroleum developments in 1944 (with Porter, W. W., II)	124	(9)	8437
Griffiths, J. C. Report on exploration for oil in British Guiana (with Kugler, Mackenzie, Stainforth, and Brotherhood)	124	(3)	8376
_____ Clay research and oil development problems	124	(9)	8430
Grigoriev, D. P. Native magnetic gold (with Obruchev, V. A.)	126	(2)	8671
Grim, R. E. Differential thermal analysis of clays and shales, a control and prospecting method (with Rowland, R. A.)	126	(6)	8730
Gross, H. E. Possibilities and problems of drilling beyond the continental shelf (abs.)	125	(9)	8602
_____ Possibilities and problems of drilling beyond the continental shelf	127	(9)	8921
Guelke, R. A geophysical prospecting instrument using alternating currents of audio-frequency	124	(4)	8390
Gutenberg, Beno. Earthquake study in southern California, 1944 (with Richter, C. F.)	125	(3)	8528
_____ Earthquake study in southern California, 1945 (with Richter, C. F.)	127	(3)	8847
Guyod, Hubert. Electric log interpretation, Parts 1-4	124	(4)	8391
_____ Caliper well logging: Part 4, Caving pattern in abnormal shales	124	(9)	8431
_____ Well logging methods studied at Texas A & M College	126	(8)	8744
_____ Temperature well logging: Heat conduction	127	(6)	8889
Guzman, J. A. Report of the minister of mines and petroleum, Colombia (in Spanish)	127	(1,3)	8812

H

Hales, A. L. A seismic investigation of the Witwatersrand earth tremors (with Gane, P. G., and Oliver, H. A.)	126	(3)	8680

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	Abs.	Class	No.
Hanners, A. J. A continuously recording declination station (with Keller, Fred, Jr.)	127	(2)	8833
Hansen, W. W. Object detecting apparatus and method, U. S. Patent 2,406,371 (with Varian, R. H., and Varian, S. F.)	126	(10)	8806
Harang, Leiv. The mean field of disturbance of polar geomagnetic storms	127	(2)	8829
Hare, D. G. C. Method and apparatus for logging wells, U. S. Patent 2,381,904	124	(10)	8468
_____ Radiation detector, U. S. Patent 2,397,071	126	(10)	8794
_____ Radiation detector, U. S. Patent 2,397,072	126	(10)	8795
_____ Radiation detector, U. S. Patent 2,397,073 (with Herzog, G.)	126	(10)	8796
_____ Radiation detector, U. S. Patent 2,397,074 (with Herzog, G.)	126	(10)	8797
_____ Radiation detector, U. S. Patent 2,397,075 (with Herzog, G.)	126	(10)	8798
_____ Radiation detector, U. S. Patent 2,397,661	127	(10)	8950
_____ Radiation detector, U. S. Patent 2,398,934	127	(10)	8951
Harrington, G. G. Electrical logging apparatus, U. S. Patent 2,388,141	124	(10)	8462
Harris, Sidon. Refraction exploration in West Texas (with Peabody, G.)	124	(3)	8371
_____ West Texas modern refraction seismic exploration	127	(3)	8848
Hartmann, P. C. P. Geomagnetic anomalies in the Netherlands (in Dutch)	127	(2)	8830
Hasbrook, A. F. Geophysical prospecting apparatus, U. S. Patent 2,383,966	124	(10)	8476
_____ Geophysical prospecting apparatus, U. S. Patent 2,384,739	124	(10)	8477
Hasselmann, K. F. A technique for making torsion balance surveys in inundated areas	124	(1)	8332
Hawkes, H. E. Magnetic exploration for iron ore in northern New York (with Balsley, J. R.)	125	(2)	8502
Hayes, R. C. Earthquakes in New Zealand during the year 1944	125	(3)	8529
Hayward, J. T. Well surveying apparatus, U. S. Patent 2,396,420 (with Cooley, E. H.)	124	(10)	8466
_____ Apparatus for determining permeability of porous media, U. S. Patent 2,390,252	126	(10)	8803
Heald, K. C. Introduction to the Summary of Research Results prior to 1932	124	(6)	8404
Hedstrom, Helmer. Report on test made with the Nørgaard gravimeter in Nottinghamshire on 8th May, 1946	126	(1)	8650
Hée, Mrs. Arlette. The effect of the thickness of thorium in rocks (in French)	127	(5)	8881
Heiland, C. A. Geophysics - Annual Review 1945	125	(8)	8582
Heinrich, R. R. Northeastern Ozark earthquakes	126	(3)	8684

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	Abs.	Class	No.
Hemberger, S. J. A study of fault determinations by geophysical methods in the fluorspar areas of western Kentucky (with Lee, F. W.)	126	(4)	8714
Herbert, Paul, Jr. Geological aspects of prospecting and areas of prospecting in the zinc-lead district of northwestern Illinois (with Willman, H. B., and Reynolds, R. R.)	126	(4)	8720
Heroy, W. B. Foreign geophysical activities	127	(8)	8905
Herzog, Gerhard. Method and apparatus for logging bore holes, U. S. Patent 2,378,408	124	(10)	8467
_____ Radiation detector, U. S. Patent 2,397,073 (with Hare, D. G. C.)	126	(10)	8796
_____ Radiation detector, U. S. Patent 2,397,074 (with Hare, D. G. C.)	126	(10)	8797
_____ Radiation detector, U. S. Patent 2,397,075 (with Hare, D. G. C.)	126	(10)	8798
Hess, V. F. A new determination of Eve's constant (with Balling, E.)	125	(5)	8556
Hocott, C. R. Well logging, U. S. Patent 2,387,513	124	(10)	8461
Holmes, Arthur. An estimate of the age of the earth	125	(5)	8557
Hoover, Herbert, Jr. Seismic exploration system, U. S. Patent 2,395,481	124	(10)	8457
Horni, P. P. Method of determining the effective range of magnetic detectors, U. S. Patent 2,378,014	124	(10)	8444
Horton, C. W. Interpretation of isostatic anomalies south of Java, using integral equations and crustal deformation theories	126	(1)	8651
Horvitz, Leo. Recent developments in geochemical prospecting for petroleum	124	(7)	8408
_____ Geochemical prospecting, U. S. Patent 2,400,420	125	(10)	8640
Hoskins, E. E. Seismic prospecting system, U. S. Patent 2,378,925 (with Moore, R. M.)	124	(10)	8450
Howe, H. H. Magnetic observatory results at Tucson, Ariz., for 1935-36 (with Knapp, D. G.)	124	(2)	8347
_____ Magnetic observatory results at Tucson, Ariz., for 1937-38 (with Hurwitz, Louis)	125	(2)	8503
_____ Magnetic observatory results at College, near Fairbanks, Alaska, for the second polar year October 1932 to March 1934	126	(2)	8664
_____ Magnetic observatory results at San Juan, Puerto Rico, for 1929-30 (with Hurwitz, Louis)	127	(2)	8831
Howell, L. G. Radioactivity well-logging, U. S. Patent 2,391,093	124	(10)	8471
Hoylman, H. W. Seismograph evidence on the salt in southeast Texas	124	(3)	8372
_____ Seismograph evidence on depth of salt column, Moss Bluff dome, Texas	126	(3)	8685
Hubbert, M. K. Some physical considerations bearing upon the theory of isostasy	124	(1)	8333

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	Abs.	Class	No.
Huelin, G. S. Determination of the form of the earth and the theorem of Stokes (in Spanish).....	127	(1)	8813
Hummel, F. E. Mud logging system, U. S. Patent 2,400,046	127	(10)	8955
Hurwitz, Louis. Magnetic observatory results at Tucson, Ariz., for 1937-38 (with Howe, H. H.).....	125	(2)	8503
_____ Magnetic observatory results at San Juan, Puerto Rico, for 1929-30 (with Howe, H. H.).....	127	(2)	8831
I			
Illing, V. C. Geology applied to petroleum.....	127	(9)	8922
Independent Petroleum Association of America Monthly. Exploration associations hold meeting.....	125	(8)	8583
Inglada, Vincente. Tables of the intervals ($t_{pP} - t_P$) and ($t_{sS} - t_S$) for the analysis of earthquakes with a deep hypocenter (in Italian).....	126	(3)	8686
International Nickel Company of Canada. The operations and plants of the International Nickel Co. of Canada; ed. by Rowe, R. C.	126	(2)	8665
Ising, G. On the magnetic properties of varved clay.....	124	(2)	8344
Ivanhoe, L. F. Geophysical crews lick the jungles.....	125	(3)	8530
Ives, G. O. Columbia exploratory activity.....	126	(3)	8687
J			
Jackson, W. J. Some practical aspects of radioactivity well logging (with Campbell, J. L. P.).....	124	(5)	8399
Jenkins, D. S. The origin, distribution, and airphoto identification of United States soil (with others).	127	(9)	8923
Jenny, W. P. Structural interpretation of micromagnetic and other data.....	125	(2)	8504
Jensen, Homer. Validity of data from airborne magnetometer.....	127	(2)	8832
Johnson, E. R. F. Device for viewing underwater bodies, U. S. Patent 2,396,267.....	124	(10)	8484
Johnson, J. B. Explosive cartridge, U. S. Patent 2,378,223.....	124	(10)	8449
Johnston, H. F. American Magnetic Character Figure, etc., April-June, and July-September, 1945.....	124	(2)	8345
Jolliffe, A. W. Aeroprospecting in the Yellowknife area.	124	(9)	8432
Jones, W. M. The use of differences of arrival-times of P as an aid to epicentral determinations in the South Pacific.....	124	(3)	8373
_____ Note on a table of distances from South Pacific seismological observatories.....	124	(3)	8374
_____ The seismic geometry of a volcano such as Ruapechu	126	(3)	8688
Jung, Karl. The geophysical exploration of the subsurface (in German).....	127	(8)	8906

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	Acs.	Class	No.
K			
Kahn, F. Galvanic corrosiveness of soil waters (with Phelps, H. S.)	126	(4)	8717
Kazinsky, V. A. On the precision of determination of gradient of curvature (in Russian)	126	(1)	8652
_____ On the application of curvatures	127	(1)	8814
Keller, Fred, Jr. The magnetic work of the U. S. Coast and Geodetic Survey at Paricutin volcano, Michoacan, Mexico, 1945	126	(2)	8666
_____ A continuously recording declination station (with Hanners, A. J.)	127	(2)	8833
Kelly, S. F. Warning re geophysics	124	(2)	8346
_____ Geophysicists suggest more joint meetings in the future	125	(8)	8584
Kendall, J. M. Airplane-noise interference with seismic prospecting	124	(3)	8375
Kennedy, G. C. Magnetic exploration of the nickel-copper deposits of Bohemia Basin, south-eastern Alaska (with Walton, M.)	124	(2)	8355
Kennedy, H. T. Geochemical prospecting method, U. S. Patent 2,406,611	127	(10)	8957
Kerr, R. B. Combination of amplitude and frequency modulation for communication in seismograph exploration for petroleum reserves (with Shook, E. M., and Olson, R. W.)	124	(3)	8385
Kettering, C. F. Temperature sensitive means, U. S. Patent 2,399,640	127	(10)	8953
Kienow, Sigismund. Geomagnetic survey of the basalt outcrops near Bad Bertrich (in German)	125	(2)	8505
Kilkenny, J. E. Geological interpretation of radioactivity well logs	127	(5)	8882
Kintz, G. M. The need of standardized instructions for handling explosives by geophysical parties	124	(8)	8416
_____ Informal discussion of explosives hazards on seismograph crews	126	(3)	8689
Kip, A. F. Design of beta-ray and gamma-ray Geiger-Müller counters (with Good, W., and Brown, S.)	126	(5)	8723
Kirnos, D. P. The Bokhara seismological expedition (with others, in Russian)	126	(3)	8690
_____ On the possibility that an alluvial soil generates natural vibrations (in Russian)	127	(3)	8849
Klepp, E. C. Electric ratiometer, U. S. Patent 2,400,308	127	(10)	8945
Knapp, D. G. Magnetic observatory results, Tucson, Ariz., for 1935-36 (with Howe, H. H.)	124	(2)	8347
Koch, W. An adjustable scale for measuring instruments	126	(9)	8767
Koenigsfeld, Louis. Magnetic survey of the manganese bearing superior Salmien in the valley of the Lienne (with Evrard, P., in French)	124	(2)	8341

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	Abs.	Class	No.
Kogbetliantz, E. G. Estimating depth and excess-mass of point sources and horizontal line sources in gravity prospecting	125	(1)	8486
Kölbel, H. Seismic surveys in the brown-coal district of Helmstedt (with Schnell, H., and Trappe, F., in German)	126	(3)	8691
Koning, L. P. G. The mechanisms in the focus of deep earthquakes (in Dutch)	127	(3)	8850
Korf, S. A. Electron and nuclear counters	125	(5)	8558
Kosminskaia, I. P. On the initial points of hodographs of Mintrop waves (in Russian)	126	(3)	8692
Koulomzine, Th. Application of geophysical prospecting to the Pre-Cambrian Shield	126	(2)	8667
Kovner, S. S. Thermal method of prospecting versus gravitational and electric methods (with Shneerson, B. L., in Russian)	124	(6)	8405
Kreis, Alfred. Seismic surveys on the Morteratsch-glacier (in German)	125	(3)	8531
Kremer, J. T. Well sounding microphone, U. S. Patent 2,403,535	127	(10)	8961
Kriegel, M. W. Apparatus for gas analysis, U. S. Patent 2,389,706 (with Williams, P. S.)	125	(10)	8638
Krug, J. A. Development of oil and gas on the public domain	126	(8)	8745
_____ Federal policy on petroleum exploration and conservation	127	(9)	8924
Krynine, P. D. The tourmaline group in sediments	125	(9)	8603
Ku, K. H. An investigation of the Chaotung lignite field by the Wenner's resistivity method of electrical prospecting (with Wang, T. C., and Chang, H. C.)	124	(4)	8392
Kuenen, P. H. The geological results of the Snelius expedition (with Neeb, G. A.)	125	(5)	8559
Kugler, H. G. Report on exploration for oil in British Guiana, (with Mackenzie, Stainforth, Griffiths, and Brotherhood)	124	(3)	8376
Kunasheva, K. G. The use of radiochemical analysis for the correlation of geological strata (with Baranov, V. I., and Tseitlin, S. G., in Russian)	124	(5)	8395
Kutscher, Fritz. Geomagnetic measurements upon magnetite deposits in southern Riesengebirge (in German)	126	(2)	8668

L

Lahee, F. H. Review of exploratory drilling statistics, 1938-1944	124	(8)	8417
_____ Wildcat drilling in 1945	125	(9)	8604
LaCoste, L. J. B. Force measuring instrument, U. S. Patent 2,377,889 (with Romberg, A.)	124	(10)	8440
Langley, K. J. Brazil shows good geologic possibilities of commerical quantities of petroleum	125	(8)	8585

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	Abs.	Class	No.
Lannuzel, J. Electric logs: How affected by mud invasion into formation (with Souchon, E.)	125	(4)	8549
Lee, F. W. Geophysical exploration of submerged areas on the Continental Shelf of the United States territories	125	(8)	8586
_____ A study of fault determinations by geophysical methods in the fluorspar areas of western Kentucky (with Hemberger, S. J.)	126	(4)	8714
_____ Prospecting for mineralization in steeply dipping beds covered by glacial till, talus, and weathered zones (with Scharon, H. L., and Sandberg, C. H.)	127	(4)	8873
Lees, G. M. Oilfields in Great Britain	125	(3)	8532
Leet, L. D. A three-component portable seismograph for the measurement of vibrations	124	(3)	8377
_____ Earth motion from the atomic bomb test	126	(3)	8693
_____ Vibrations from blasting	127	(3)	8851
Lewis, W. B. Let us look at electrical prospecting	125	(4)	8550
Lipson, Edward. Soil analysis by radiant energy: U. S. Patent 2,394,703	126	(10)	8793
Lisiutin, A. Ia. On the propagation velocity of sound in oil wells (in Russian)	126	(8)	8746
Logachev, A. A. The development and applications of airborne magnetometers in the U.S.S.R.	125	(2)	8506
Longwell, C. R. Tectonic map of the United States	125	(9)	8608
Lorenz, Egon. Counting rate and frequency meter (with Weikel, J., and Norton, S. G.)	126	(5)	8725
Lovely, H. R. Geological occurrence of oil in United Kingdom with reference to present exploratory operations	127	(9)	8925
Lundberg, H. T. F. Modern methods in geophysics	125	(8)	8587
Lyon, Duane. Automatic map-plotting instruments	127	(9)	8926
Lyons, P. L. The low velocity layer in seismic exploration	124	(3)	8378

M

Macelwane, J. B. Progress report of the Jesuit Seismological Association for 1944	125	(3)	8533
_____ The problem of microseisms and ocean storms	126	(3)	8694
_____ The interior of the earth	127	(3)	8852
MacHenry, Richard. Means for installing magnetic devices and supports therefor, U. S. Patent 2,405,595 (with Miller, J. F. G.)	127	(10)	8941
Mackay, D. K. Oil and gas development in Arkansas in 1945 (with Sanders, J. W.)	126	(8)	8747
Mackay, R. A. The control of impounding structures on ore deposition	125	(9)	8605
Mackenzie, S. C. Report on exploration for oil in British Guiana (with Kugler, Stainforth, Griffiths, and Brotherhood)	124	(3)	8376

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	Abs.	Class	No.
Magnée, I. de. Geophysical methods of exploration and the geological laboratory (in French)	125	(2,4)	8507
Marcantoni, Alessandro. On the localization of a spherical body identifiable with a sphere by means of the torsion balance of Eötvös (in Italian)	125	(1)	8487
Maree, B. D. The Vredefort structure as revealed by a gravimetric survey	126	(1)	8653
_____ Notes on some magnetometric surveys with special reference to anomalies on Karrov dolerites	126	(2)	8669
Markus, John. Electronics dictionary, 1st ed., 1945 (with Cooke, N. M.)	124	(9)	8427
Martin, Richard. Explosive cartridge assembly, U. S. Patent 2,396,518	126	(10)	8785
Martin, Rodrigo. Oscillation of unelastic soils (in Spanish)	125	(3)	8534
_____ Lateral variations of velocity in seismograph prospecting (in Spanish)	126	(3)	8695
Masarsky, S. I. On hodographs of seismic waves reflected from the lower boundary of a medium with a variable velocity of propagation (in Russian)	127	(3)	8853
Matthews, T. H. An elementary proof that the path of a seismic wave will be circular if the velocity increases with depth	124	(3)	8379
_____ An elementary proof of a theorem in geophysics	125	(3)	8535
Mayne, W. H. Seismic surveying, U. S. Patent 2,400,245	125	(10)	8628
McCahon, J. F. A portable counting rate meter for G-M tubes	125	(5)	8560
McCarver, H. C. Geology and geophysics of the Odem Oil Field, San Patricio County, Texas (with West, L. G.)	125	(3)	8536
McGaha, S. W. Full knowledge of well conditions aids in radioactivity well-logging operations (with Walker, J. M.)	126	(5)	8729
McKee, A. H. Geophysical operations in Kuwait (with Boots, P. H.)	125	(8)	8577
McKellar, I. C. An alpha-ray ionization chamber for radioactivity measurements	127	(5)	8883
McLellan, A. G. Construction of self-quenching G-M tubes	127	(5)	8884
McNish, A. G. Quadrantal corrector for magnetic compass, U. S. Patent 2,390,844	124	(10)	8446
_____ An induction magnetometer: Principle of operation	125	(2)	8509
Medina, M. Gravimetry in Mexico (with Carreno, A., and Toscano, R., in Spanish)	125	(1)	8488
Mekhtiev, S. F. Petroleum prospecting by means of gas sampling (in Russian)	124	(7)	8409
Melton, F. A. Preliminary observations on geological use of aerial photgraphs	124	(9)	8433
_____ Aerial photography aids geologists	125	(9)	8606
Mercier, V. J. Radioactivity logging of dolomites	125	(5)	8561

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	Abs.	Class	No.
_____Interpretation of radioactivity logs.....	126	(5)	8726
_____Radioactivity well-logs: Interpretation and application.....	127	(5)	8885
Merino y Coronado, J. Notes on a new type of electronic earthquake recorder.....	127	(3)	8854
Merritt, J. W. Geotechniques of oil exploration.....	125	(8)	8588
Metcalf, H. E. Method of obtaining soil gas samples, U. S. Patent 2,386,832 (with Zaikowksy, W. M.).....	124	(10)	8473
_____ Apparatus for analysing hydrocarbons, U. S. Patent 2,393,650.....	126	(10)	8801
Meyer, O. A few tables of the terrestrial magnetism records at Wingst observatory in the year 1940 (in German).....	124	(2)	8348
Military Service Publishing Company. Map and aerial photograph reading - complete.....	127	(9)	8927
Miller, A. H. Gravimetric surveys of 1943 in New Brunswick.....	124	(1)	8334
_____ Gravimetric surveys of 1944 in New Brunswick.....	126	(1)	8654
Miller, J. F. G. Means for installing magnetic detecting devices and supports therefor, U. S. Patent 2,405,595 (with MacHenry, R.).....	127	(10)	8941
Millington, J. W. Electrical prospecting method and apparatus, U. S. Patent 2,398,800.....	125	(10)	8631
_____ Electrical prospecting apparatus, U. S. Patent 2,408,029 (with Bazzoni, C. B.).....	127	(10)	8948
Mine and Quarry Engineering. Rock temperatures.....	125	(6)	8566
Miner, K. H. Some aspects of the mathematical interpretation of electric logs (with Baker, J. S.).....	127	(4)	8867
Mining and Industrial Magazine of Southern Africa. Seeking oil by means of bacteria.....	124	(7)	8419
Mining Journal, London. Temperatures in Rand mines.....	124	(6)	8406
_____ Novel Russian method of prospecting for oil.....	127	(7)	8893
_____ Submarine oil deposits.....	127	(8)	8907
Mining Journal, Phoenix, Ariz. Magnetometer proved to be valuable in Oregon tests.....	124	(2)	8349
_____ Bureau releases program for mining reconversion...	124	(8)	8413
Mining Magazine, London. Craelius Co. issues a catalogue on geophysical surveying.....	125	(1)	8489
Mining Record, Denver, Colorado. Fisher research using new M-Scope at Whitlock mine.....	126	(4)	8715
_____ M-Scope directed workers to ore.....	127	(4)	8874
Minton, J. P. Method and apparatus for recording seismic waves, U. S. Patent 2,392,758 (with Broding, R. A.).	126	(10)	8784
Mitchell, D. R. Geological sessions include a bit of geophysics and fluorescence.....	125	(8)	8589
Mitchell, W. R. Q-meter for low-frequency reactor measurements (with Wipff, F. P.).....	125	(8)	8590
Modriniak, N. Geophysical investigations and drilling results east of Karapiro dam.....	125	(2,3)	8509

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	Abs.	Class	No.
Molin, Kurt. A general earth magnetic investigation of Sweden carried out during the period 1928-1934 by the Geological Survey of Sweden. Parts 3-4, horizontal intensity, vertical intensity, and horizontal disturbing force	124	(2)	8350
Moon, L. B. Trends in exploration of mineral deposits	124	(9)	8434
Moore, M. E. Apparatus for making gravity measurements, U. S. Patent 2,389,866	124	(10)	8442
Moore, R. M. Seismic prospecting system, U. S. Patent 2,378,925 (with Hoskins, E. E.)	124	(10)	8450
Morelli, Carlo. Magnetic measurements in Albania (in Italian)	125	(2)	8510
Morgan, H. C. Radio navigation system and method, U. S. Patent 2,396,112	126	(10)	8804
Morris, G. The effect of velocity of detonation on the efficiency of explosives used in seismic prospecting (with Taylor, J., and Richards, T. C.)	126	(3)	8703
Muehlhause, C. O. Geiger-Müller counter technique for high counting rates (with Friedman, H.)	127	(5)	8886
Muffly, Gary. The airborne magnetometer	126	(2)	8670
N			
Narvarte, Peter E On well-velocity data and their application to reflection shooting	124	(3)	8380
_____ Blasting cap, U. S. Patent 2,377,804	124	(10)	8448
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_____ Oil and gas field development in United States 1944 (Year Book 1945)	125	(9)	8607
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National Research Council, U. S. A. American Geophysical Union: Account of 25th annual meeting, 1944	124	(8)	8420
_____ Tectonic map of the United States	125	(9)	8608
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Neeb, G. A. The geological results of the Snellius expedition (with Kuenen, P. H.)	125	(5)	8559
Nelson, A. Disrupted strata	124	(9)	8435
Nelson, J. H. Additional data on the spontaneous increase of magnetic moment (with Campbell, J. B.)	125	(2)	8511
Nettleton, L. L. Geophysical history of typical Mississippi salt domes	126	(1,3)	8655
Neufeld, Jacob. Method and apparatus for seismic prospecting, U. S. Patent 2,395,289	124	(10)	8455
_____ Method of and apparatus for investigation of cased drill holes, U. S. Patent 2,400,593	127	(10)	8946
Neumann, Frank. Progress report on the seismological activity of the U. S. Coast and Geodetic Survey, 1944-45	125	(3)	8537

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	Abs.	Class	No.
Neumann, L. J. Multiple refraction shooting in southern California	125	(3)	8538
Nevill, G. E. Means and method of surveying wells, U. S. Patent 2,369,403	124	(10)	8443
Nichols, C. R. Electrical prospecting method and apparatus, U. S. Patent 2,401,371 (with Pearson, J. M.)	125	(10)	8633
Nichols, E. A. Geothermal gradients in mid-continent and Gulf-coast oil fields	127	(6)	8890
Nicholson, G. B. Airborne magnetometer expedites geophysical surveys	125	(2)	8512
Niggli, E. Magnetic analysis of iron ores (with Gassmann, F., in German)	125	(2)	8500
Nikiforoff, N. A. Geophysical methods as means of detecting and studying gold deposits (in Russian)	126	(2,4)	8716
Nikolaev, N. Devonian oil found in the Urals	124	(9)	8436
Norton, Sue Gay. Counting rate and frequency meter (with Lorenz, E., and Weikel, J.)	126	(5)	8725

O

Obruchev, V. A. Native magnetic gold (with Grigoriev, D. P.)	126	(2)	8671
Oddone, Emilio. Elements of a map of the radioactivity characteristics of Italian soil (in Italian)	125	(5)	8562
Oil, New Orleans, Louisiana. Seeking oil beneath Bahaman waters	127	(1)	8815
Oil and Gas Journal. Venezuela's 1946 exploratory program biggest in history	125	(8)	8591
Oil News, Albuquerque, New Mexico. Atomic energy may revolutionize oil locating methods	126	(5)	8727
Oil Weekly, Houston, Texas. A seismograph crew on the Mississippi	125	(3)	8539
_____ Radioactivity experiments aim at finding new reserves	125	(5)	8563
_____ 1946 World Oil Atlas	126	(9)	8768
Oks, Meyer. Method of refraction (in Spanish)	127	(3)	8855
Oliver, H. A. A seismic investigation of the Witwatersrand earth tremors (with Gane, P. G., and Oliver, H. A.)	126	(3)	8680
Olson, R. W. Combination of amplitude and frequency modulation for communication in seismograph exploration for petroleum reservoirs (with Shook, E. M., and Kerr, R. B.)	124	(3)	8385
Omer, G. C., Jr. Seismic areas and secular magnetic variations	125	(2,3)	8513
Oppenheim, Victor. Geological outline of South American oil fields	127	(9)	8928
Osterhoudt, W. J. The seismograph discovery of an ancient Mississippi River Channel	127	(3)	8856

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	Abs.	Class	No.
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P			
Parr, J. O., Jr. Seismic surveying, U. S. Patent 2,390,322	125	(10)	8626
Paver, G. L. The application of the electrical resistivity method of geophysical surveying to the location of underground water	125	(4)	8552
Pawlowski, Stanislaw. Gravimetric measurements in Poland through 1938	126	(1)	8656
Peabody, Gwendolyn. Refraction exploration in West Texas (with Harris, S.)	124	(3)	8371
Pearson, J. M. Electrical prospecting method and apparatus, U. S. Patent 2,401,371 (with Nichols, C. R.)	125	(10)	8633
Pendse, C. G. On the theory of seismometers	127	(3)	8857
Perri, Emilio. Concerning a new accelerometer and the related method of differential readings for rapid determination of maximum seismic force (in Italian).	126	(3)	8696
_____ Determination of hypocentral depth by means of a new energy method (in Italian)	127	(3)	8858
Peterson, R. A. Geological prospecting system, U. S. Patent 2,388,703	124	(10)	8452
Petroleum Times, London. Anglo-American Oil Co.'s search for oil in Britain	127	(1)	8816
_____ Oil resources in the British empire and mapping by radar	127	(8)	8908
Petroleum World, Los Angeles. Scouting the oil fields	127	(2)	8834
Pettersson, Hans. Iron and manganese on the ocean floor.	126	(9)	8769
_____ Manganese nodules and the chronology of the ocean floor	127	(5)	8887
Petty, O. S. Seismic surveying, U. S. Patent 2,395,427.	124	(10)	8456
_____ Seismic apparatus and method, U. S. Patent 2,408,478	127	(10)	8943
Peyton, Garland. Progress of oil search in Georgia	127	(9)	8929
Phelan, S. R. Method for making geophysical surveys, U. S. Patent 2,382,093	124	(10)	8460
Phelps, H. S. Galvanic corrosiveness of soil waters (with Kahn, F.)	126	(4)	8717
Piety, R. G. Well surveying, U. S. Patent 2,385,378	124	(10)	8469
_____ Method of surface prospecting, U. S. Patent 2,390,270	126	(10)	8786
Pirson, S. J. Disturbing factors in geochemical prospecting	125	(7)	8572
_____ Emanometric oil and gas prospecting	126	(7)	8635
_____ Reflection on the origin of oil	126	(9)	8770
Poldini, E. M. Certain considerations relative to geophysical interpretation (in French)	126	(4)	8718

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	Abs.	Class	No.
Polkanov, A. A. An absolute time scale for the history of the earth (with Gerling, E. K., in Russian).....	126	(5)	8728
Pontecorvo, Bruno. Well Surveying, U. S. Patent 2,398,324.....	125	(10)	8636
Porter, W. W., II, Significant California petroleum developments in 1944 (with Gregersen, A. A.).....	124	(9)	8437
Pratt, W. E. Petroleum on the continental shelves.....	127	(9)	8930
Purves, J. C. Magnetic field responsive device, U. S. Patent 2,383,460 (with Beach, L. F.).....	124	(10)	8445
_____ Magnetic field responsive device, U. S. Patent 2,374,166 (with Beach, L. F.).....	125	(10)	8618
R			
Raaf, J. F. M., de Notes on the geology of the southern Rumanian oil district with special reference to the occurrence of a sedimentary laccolith.....	126	(9)	8771
Rada, F. D., de Lectures on radioactivity (in Spanish)..	127	(5)	8888
Radio Craft, New York. Earthquake recorder.....	124	(3)	8381
Rankine, A. O. Geophysical prospecting for oil in India (with Evans, P.).....	125	(1,8)	8490
_____ Prospecting for oil.....	127	(1,3)	8817
R. C. A. Manufacturing Co. Bibliography on supersonics..	127	(9)	8931
Reed, J. C. Recent investigations by U. S. Geological Survey of petroleum possibilities in Alaska.....	127	(9)	8932
Reed, L. C. San Pedro oil field, province of Salta, northern Argentina.....	125	(9)	8609
Reed, Paul. Socony-Vacuum explores Barinas, Venezuela's largest concession.....	126	(3)	8697
_____ Exploration of Orinoco delta frought with difficulties of terrain and climate.....	127	(3)	8859
Reichert, Conrad. Method of seismic surveying, U. S. Patent 2,384,851.....	127	(10)	8942
Reynolds, R. R. Geological aspects of prospecting and areas of prospecting in the zinc-lead district of northwestern Illinois (with Willman, H. B., and Herbert, Paul, Jr.).....	126	(4)	8720
Rice, D. A. Use of shoran in geodetic control (with Aslakson, C. I.).....	127	(9)	8916
Richards, Horace G. The subsurface stratigraphy of the Atlantic coastal plain.....	124	(9)	8438
Richards, M. E. Magnetic surveying in progress in Missouri iron ore areas.....	124	(2)	8351
Richards, T. C. The effect of velocity of detonation on the efficiency of explosives used in seismic prospecting (with Taylor, J., and Morris, G.).....	126	(3)	8703
Richter, C. F. Earthquake study in southern California, 1944 (with Gutenberg, B.).....	125	(3)	8528
_____ Earthquake study in southern California, 1945 (with Gutenberg, B.).....	127	(3)	8847

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	Abs.	Class	No.
Rinehart Oil News Company of Oklahoma. Rinehart's Yearbook, 1946	125	(9)	8610
Rittenhouse, G. The texture of Mississippi, Upper Devonian, and Lower Pennsylvania sandstones in the Appalachian basin (with Carter, E.)	125	(9)	8611
_____ Grain roundness - a valuable geologic tool	127	(9)	8933
Riznichenko, Iu. V. On the relationship between layer velocities, boundary velocities, and average velocities (in Russian)	126	(3)	8698
_____ Contribution to the development of the theory of borehole seismographs (in Russian)	126	(3)	8699
_____ Method for transforming space in the seismics of continuous media (in Russian)	127	(3)	8860
Roberts, J. E. Spectrum of radium (B + C) gamma rays	125	(5)	8564
Roberts, John. The parent substance of petroleum	125	(9)	8612
Roberts, R. J. Directional seismograph pickup, U. S. Patent 2,390,328	125	(10)	8627
Robertson, Florence. On long-period seismographic disturbances	124	(3)	8382
_____ On the problem of ground motion	125	(3)	8541
Rogers, S. D. Spray deflector for shot holes, U. S. Patent 2,387,770 (with Rudolph, P. J., and Crawford, W. L.)	125	(10)	8622
Roggen, F. Regarding an after-effect produced in counters by X-ray illumination (with Scherrer, P., in German)	124	(5)	8400
Roman, Irwin. An observational method to overcome zero drift error in field instruments	127	(1,2)	8818
Romanoff, Melvin. Progress report on the behavior of zinc-iron couples in soil	127	(4)	8875
Romberg, Arnold. Force measuring instrument, U. S. Patent 2,377,889 (with LaCoste, L. J. B.)	124	(10)	8440
Roper, E. E. Geochemical prospecting, U. S. Patent 2,395,014	124	(10)	8474
Rosaire, E. E. The premium technological discovery of petroleum	126	(8)	8748
Rosenzweig, Alfredo. Seismological bibliography of Peru (in Spanish)	125	(3)	8540
Rothé, Edmond. Concentration of radioactivity	125	(5)	8565
_____ The present problems of theoretical and applied geophysics (in French)	126	(8)	8749
_____ Earthquakes: Their causes and effects (in French)	127	(3)	8861
Rothé, J. P. Magnetic prospecting of the iron deposit of the Puymorens mine (with Cattala, L., in French)	124	(2)	8339
_____ The seismic activity of the French Alps in 1938 and the seismicity of the Western Alps (in French)	124	(3)	8383
Rougerie, Paul. Contribution to the study of telluric currents (in French)	125	(2)	8514

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	Abs.	Class	No.
Rowe, R. C. The operations and plants of the International Nickel Company of Canada	126	(2)	8665
Rowland, R. A. Differential thermal analysis of clays and shales, a control and prospecting method (with Grim, R. E.)	126	(6)	8730
Rozlosnik, Andres. Antecedents and prospects of oil exploration in Argentina (in Portuguese)	125	(8)	8592
Rudolf, P. J. Spray deflector for shot holes, U. S. Patent 2,387,770 (with Rogers, S. D., and Crawford, W. L.)	125	(10)	8622
Russell, W. L. Apparatus for well logging, U. S. Patent 2,398,562	127	(10)	8958
S			
Samuell, J. H. Pre-Permian radioactivity surveys in west Texas and New Mexico (with Campbell, J. L. P.)	127	(5)	8878
Sandberg, C. H. Prospecting for mineralization in steeply dipping beds covered by glacial till, talus, and weathered zones (with Lee, F. W., and Scharon, H. L.)	127	(4)	8873
Sanders, C. S. Detecting salt water intrusion, U. S. Patent 2,379,106	124	(10)	8459
Sanders, J. W. Oil and gas development in Arkansas in 1945 (with Mackay, D. K.)	126	(8)	8747
Savarenskii, E. F. Concerning the determination of an epicenter (in Russian)	127	(3)	8862
Saxov, S. E. Some gravity measurements on the island of Bornholm	127	(1)	8819
Scharon, H. L. Prospecting for mineralization in steeply dipping beds covered by glacial till, talus, and weathered zones (with Lee, F. W., and Sandberg, C, H.)	127	(4)	8873
Scheffer, Vittorio. The gravimetry of the anticline of Fontevivo (in Italian)	126	(1)	8657
_____ On the use of the gravimeter in mountainous terrain (in Italian)	127	(1)	8820
Scherbatskoy, S. A. Central electrod support, U. S. Patent 2,390,965	125	(10)	8635
Scherrer, P. Regarding an after-effect produced in counters by X-ray illumination (with Roggen, F. in German)	124	(5)	8400
Schiflett, H. L. Quantitative interpretation of gravimetric data	125	(1)	8491
Schlumberger, Marcel. Gun perforator, U. S. Patent 2,381,081	124	(10)	8483
Schlumberger, R. A. Relation between the tectonics and the morphology of the plain of the Rhine in Alsace and the Grand Duchy of Baden (in French)	127	(8)	8909

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	Abs.	Class	No.
Schnell, H. Seismic surveys in the brown-coal district of Helmstedt (with Kolbel, H., and Trappe, F., in German)	126	(3)	8691
Scholte, J. G. On the Stonely-wave equation	126	(3)	8700
Science Illustrated, New York. Prospecting by air	126	(9)	8772
Science Museum, London. Quarterly bibliography of applied geophysics, 1938+	127	(8)	8910
Scientific American, New York. Shoran maps	127	(9)	8934
Scott, G. N. Process and means for measuring soil resistivity and certain electrical characteristics associated with a buried pipe line, U. S. Patent 2,378,440	124	(10)	8458
Scott, H. H. An analyzer for sub-audible frequencies	125	(3)	8542
Scott, Richard. Remote reading temperature instrument, U. S. Patent 2,393,197	126	(10)	8799
Scott, W. E. Mean K-indices from 30 magnetic observatories and preliminary international character figures for 1944	124	(2)	8352
_____ American magnetic character-figure, etc. for Oct.-Dec. 1945, and summary for 1945	125	(2)	8515
_____ American magnetic character-figure, etc., for Jan.-June, 1946	127	(2)	8835
Seeley, S. W. Shoran precision radar	126	(2)	8672
Seismograph Service Corporation of Delaware. South American Oil Zones, Pt. 2	125	(3)	8543
Seward, Albert. Geology for everyman	125	(9)	8613
Sharpe, J. A. Recording system in seismic surveying U. S. Patent 2,394,990 (with Eisler, J. D.)	124	(10)	8454
_____ Seismic surveying, U. S. Patent 2,390,187	125	(10)	8625
Sheffet, David. Geophysical prospecting equipment	124	(3)	8384
Shepard, Ward, Jr. A recording six-trace cathode-ray oscillograph (with Beyer, G. L., Jr.)	126	(3)	8677
Shneerson, B. L. Thermal method of prospecting versus gravitational and electric methods (with Kovner, S. S., in Russian)	124	(6)	8405
Shook, E. M. Combination of amplitude and frequency modulation for communication in seismograph exploration of petroleum reservoirs (with Olson, R. W., and Kerr, R. B.)	124	(3)	8385
Shpak, V. A. Some data on the physical foundations of radioactive geophysical methods of exploration (with Gorshkov, G., Grammakov, W., and Starik, I., in Russian)	126	(5)	8724
Sieberg, A. Mechanical processes in the destruction of buildings by seismic action (in Italian)	126	(3)	8701
Silgado, E. F. Seismological data of Peru (in Spanish)	125	(3)	8544
Silverman, Daniel. Well logging, U. S. Patent 2,389,241	124	(10)	8464
_____ Apparatus for electrical well logging, U. S. Patent 2,398,868 (with Stuart, R. W.)	125	(10)	8632

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	Abs.	Class	No.
_____ Time cycle telemetering, U. S. Patent 2,400,170....	127	(10)	8960
Skillings' Mining Review, Duluth, Minn. Employ helicopter for first time to explore remote mining regions.....	126	(2)	8673
_____ Magnetic base stations for the Iron Ranges.....	127	(2)	8836
Sloat, John. Is the seismograph still champion?.....	125	(3)	8545
Smith, Hampton. Review of petroleum exploration sciences.	124	(3)	8386
Société de Prospection Electrique, Paris. Device for electrically studying earth formations, Dutch Patent 49,596.....	127	(10)	8949
Souchon, E. Electric logs: How affected by mud invasion into formation (with Lannuzel, J.).....	125	(4)	8549
Speaker, D. M. Electronic surgical metal body locator, U. S. Patent 2,393,717.....	126	(10)	8805
Sprengnether, W. F., Jr. A description of the instruments used to record microseisms for the purpose of detecting and tracking hurricanes.....	127	(3)	8702
Srewsbury, R. D. A theory on occurrence of salt domes....	125	(9)	8614
Stainforth, R. M. Report on exploration for oil in British Guiana (with Kugler, Mackenzie, Griffiths, and Brotherhood).....	124	(3)	8376
Standard of California. Finding oil by science.....	126	(8)	8750
_____ Through water to oil.....	127	(8)	8911
Standard Oil Development Company, N. J. Method of studying subterranean strata, Dutch Patent 48,412....	126	(10)	8792
_____ Device for measuring the vertical component of the force of gravity, Dutch Patent 49,362.....	127	(10)	8939
Starik, I. E. Radiological investigation of mineral waters in the Caucasus region (in Russian).....	124	(5)	8401
_____ Some data on the physical foundations of radioactive geophysical methods of exploration (with Gorshkov, G. V., Grammakov, A. G., and Shpak, V. A., in Russian).....	126	(5)	8724
Storm, Barry. Geophysical prospecting methods.....	125	(4)	8551
Strakhov, N. M. On the theory of salt techtonics.....	125	(9)	8615
Struth, H. J. Cost of discovering new petroleum reserves continued to increase in 1945.....	125	(9)	8616
Stuart, Joseph, II. Electric detonator, U. S. Patent 2,389,086.....	125	(10)	8624
Stuart, R. W. Apparatus for electrical well logging U. S. Patent 2,398,868 (with Silverman, D.).....	125	(10)	8632
Sturgis, H. F. Analyzing earth formations, U. S. Patent 2,379,045.....	124	(10)	8472
Swainson, O. W. Magnetic work of the U. S. Coast and Geodetic Survey from April 1944 through March 1945...	125	(2)	8516
Sweet, K. C. Gravity meter, U. S. Patent 2,383,997.....	124	(10)	8441
T			
Tanni, L. On the isostatic structure of the earth's crust in the Carpathian countries and the related phenomena	124	(1)	8335

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Tappan, C. O. Stemming device for explosive charges, U. S. Patent 2,388,232	125	(10)	8623
Targhetta, J. B. Geophysics and its relation to geology (in Spanish)	127	(8)	8912
Taylor, J. The effect of velocity of detonation on the efficiency of explosives used in seismic prospecting (with Morris, G., and Richards, T. C.)	126	(3)	8703
Technical News Bulletin, Washington, D. C. New mathematical tables	125	(9)	8617
Terada, K. Electromagnetic induction within the earth's crust of variable conductivity	124	(2)	8353
Thyssen, Stephan, von. General considerations concerning exploration of the ground for hydrocarbons, and trials in the vicinity of an oil field in northern Germany (in German)	124	(7)	8411
Tiratsoo, E. N. Future role of air transport in the search for oil	125	(8)	8593
Todd, J. D. North Florida is geologically attractive	125	(8)	8594
Toscanó, R. Gravimetry in Mexico (with Medina, M., and Carreño, A., in Spanish)	125	(1)	8488
Tovell, W. M. Structure drilling in oil exploration, southern Alberta (with Furnival, G. M.)	127	(4)	8871
Trappe, F. Seismic surveys in the brown-coal district of Helmstedt (with Kolbel, H., and Schnell, H., in German)	126	(3)	8691
Tripp, R. M. Micro-migration of gaseous hydrocarbons as related to chemical prospecting	124	(7)	8412
Tseitlin, S. G. The use of radiochemical analysis for the correlation of geological strata (with Baranov, V. I., and Kunasheva, K. G., in Russian)	124	(5)	8395
U			
Uemura, Kimio. Contribution to the results of recent geophysical prospecting in Japan	124	(3,4)	8393
Ulrich, F. P. Progress report of seismological work by the U. S. Coast and Geodetic Survey in the western United States during 1944	124	(3)	8546
Umbgrove, J. H. F. Recent theories on polar displacement	124	(2)	8354
_____ Origin of continental shelves	124	(9)	8439
_____ The pulse of the earth	126	(9)	8773
Uren, L. C. Petroleum exploration methods, well logging methods and records	127	(8)	8913
V			
Vacquier, Victor. Apparatus for responding to magnetic fields, U. S. Patent 2,406,870	126	(10)	8782
_____ Apparatus for responding to magnetic fields, U. S. Patent 2,407,202	126	(10)	8783

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_____ Review of petroleum geology in 1945	126	(9)	8774
_____ Geochemical prospecting, 1945	127	(7)	8894
Vance, H. Bibliography on the petroleum industry (with De Golyer, E.)	125	(9)	8600
Vargas, M. Note on geophysical prospecting by the electrical resistivity method (in Portuguese)	126	(4)	8719
Varian, R. H. Object detecting apparatus and method U. S. Patent 2,406,371 (with Hansen, W. W., and Varian, S. F.)	126	(10)	8806
Varian, S. F. Object detecting apparatus and method, U. S. Patent 2,406,371 (with Hansen, W. W., and Varian, R. H.)	126	(10)	8806
Varnes, D. J. Geologic mapping by means of graphic locator	127	(9)	8935
Vening-Meinesz, F. A. Gravity over the Hawaiian Archipelago and over the Madeira area; conclusions about the earth's crust	124	(1)	8336
_____ Fundamental tables for regional isostatic reduction of gravity values	125	(1)	8492
_____ Topography and gravity in the North Atlantic Ocean	126	(1)	8658
_____ The theory of Wegener (in Dutch)	127	(3)	8863
Ver Wiebe, W. A. Exploration for oil and gas in western Kansas during 1944	126	(8)	8752
_____ Exploration for oil and gas in western Kansas during 1945	127	(8)	8914
Vinson, Curtis. Mexico intensifies search for petroleum.	125	(8)	8595
V'iunov, B. F. The role of meteoric streams in the generation of magnetic storms and Aurora Borealis (in Russian)	126	(2)	8674
Volet, C. On the absolute measurement of gravity (in Fronch)	127	(1)	8821

W

Waldschmidt, W. A. Gramp's field, Archuleta County, Colorado	126	(9)	8775
Walker, J. M. Full knowledge of well conditions aids in radioactivity well logging operations (with McGaha, S. W.)	126	(5)	8729
Walker, R. C. Electronic equipment and accessories	126	(5,8)	8753
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	Abs.	Class	No.
Wang, T. C. An investigation of the Chaotung lignite field by Wenner's resistivity method of electrical prospecting (with Ku, K. H., and Chang, H. C.)	124	(4)	8392
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Weber, Reinhold. Method for determining combustible gases in gas mixtures, U. S. Patent 2,399,965	127	(10)	8954
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Weinstein, D. H. Optics of recording oscillographs	127	(3)	8864
Weiss, Oscar. Temperature measurement in a mine on the Witwatersrand with an electrical resistance thermometer	126	(6)	8732
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Wen-Po, Weng. Gravitational data from the Nan Shan Range	125	(1)	8493
West, L. G. Geology and geophysics of the Odem Oil Field, San Patricio, Texas (with McCarver, H. C.)	125	(3)	8536
West, T. S. A resistolog survey of the Loma Alto Seven Sisters area of McMullen and Duval Counties, Texas	124	(4)	8394
Westman, B. J. Geophysical surveying followed by diamond drilling	127	(4)	8876
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Widess, M. B. Effect of surface topography on seismic mapping	124	(3)	8388
Wiener, P. F. German for the scientist	127	(9)	8936
Williams, David. Mineral resources of the world	126	(8)	8754
Williams, F. J. Notes on shot-point procedure	125	(3)	8547
Williams, P. S. Apparatus for gas analysis, U. S. Patent 2,389,706 (with Kriegel, M. W.)	125	(10)	8638
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Wolff, Irving. Distance and direction determining system, U. S. Patent 2,407,198	127	(10)	8962
Woollard, G. P. Gravity observations in the Maritime Provinces (Canada)	124	(1)	8337
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Woolley, W. C. Geophysical history of the La Gloria Field, Jim Wells and Brooks Counties	125	(8)	8596
Work, R. A. Mechanized transport for snow surveying	126	(9)	8778
Workman, L. E. The use of electrical earth resistivity surveys in Illinois (with Bays, C. A., and Buhle, M. B.)	125	(4)	8553
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_____ Geological surveys are planned for continental shelf	126	(8)	8756
_____ Flying eye for oil exploration	127	(2)	8837
Wrather, W. E. Mineral resources and resourcefulness	126	(9)	8779
Wulf, O. R. On the relation between geomagnetism and the circulatory motions of the air in the atmosphere	124	(2)	8357
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